# SUGAR

JANUARY, 1958

# AZUCAR

FIVE DOLLARS PER YEAR · FIFTY CENTS PER COPY

# World's most modern tandems are lubricated by Farval automatic systems

FARVAL—
*Studies in Centralized Lubrication*
No. 189

● A new 18-roll mill now replaces two old tandems at Central Palma in Cuba; a 15-roll mill has just commenced operation at Hacienda El Palmar in Venezuela. Engineered and built by Farrel, Ansonia, Conn., these tandems, completed in 1955, represent the most modern sugar cane-grinding equipment in the industry. Both tandems have individual turbine drives with Farrel geared reductions for each mill, centralized operating controls, and a number of other improved design features which assure efficient high-capacity performance.

Playing an important part in this modern mill design, a Farval Centralized System of Lubrication automatically supplies all mill bearings of each tandem with exactly the right amount of lubrication at exactly the right time. No need for oilers—no worry of a breakdown. Guesswork lubrication is eliminated and steady production is maintained at all times.

Investigate Farval for your own equipment—whether large or small. Farval will pay for itself many times over. Farval representatives are ready to serve you in all major industrial areas—or write for Bulletin 26-R. The Farval Corporation, 3277 East 80th Street, Cleveland 4, O.

*Affiliate of The Cleveland Worm and Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.*

**KEYS TO ADEQUATE LUBRICATION—**
**Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated.**

**Pictured above is the Venezuela tandem before it was shipped from the Farrel factory last summer.**

FARVAL
CENTRALIZED SYSTEMS OF LUBRICATION

1957 has been a year of contrasts.

Significant advances in technology, the completion of a substantial portion of our program to expand our productive capacity in the U. S. and Canada and the strengthening of our marketing organization are all tangible achievements which will bring us both immediate and long-term benefits. On the other hand, a generally lower activity in new projects coming in has emphasized the narrowing profit margins faced by most businesses and points up our insistence on improving designs, reducing costs and increasing efficiencies.

Abroad, the picture is bright. Our subsidiaries report current high levels of business and there is great optimism for the future. Of particular interest is the success of our newest family member, Dorr-Oliver Pty. Ltd. of Australia, which opened its doors on January 1 of this year and by mid-year had far surpassed expectations. Growth of Dorr-Oliver (India) Ltd., another of our newer associates, has also been noteworthy, with the recent addition of local manufacturing facilities justifying still greater optimism.

**SUGAR** — In 1957 a total of 42 RapiDorr Clarifiers and 48 Oliver-Campbell Cane Mud Filters were sold to the cane sugar industry. A significant aspect of this outstanding record has been the increasing participation of our subsidiaries and representatives abroad. They are locally manufacturing, in some instances for the first time, 31 of these machines in Argentina, Brazil, England, France, Germany, India, the Philippines and South Africa.

**SANITATION** — One of the highlights of the year was D-O activity in the waste water disposal field. Four major new developments — all ideally suited for smaller plants — were introduced. The SpiroVortex System which is a complete treatment process akin to activated sludge, the Degritting Clarifier and Clarigester and the DorrClone Classifier as applied to sewage degritting have already been commercially proven at plants in the western U. S. First installations of the CompleTreator, a package plant to serve a population of 150, are now operating with some 30 additional units scheduled to start up in 1958.

Our subsidiary in the Netherlands has marketed equipment for facilities as far distant as Norway, Iraq and India, while new or enlarged D-O equipped domestic installations sold in 1957 can be found from New York City to Los Angeles and San Antonio, Texas to Fairmont, Minnesota.

**PULP AND PAPER** — Another operating "first" recorded during the past year was initial operation of the first complete D-O Pulp Bleaching System. Located at a northern New York state mill, it is the result of an extensive program to develop a new and improved continuous bleaching system for the pulp industry. Abroad, the Swedish representative of our Dutch subsidiary has just completed an outstanding year marked by one of the largest orders in their history for Bleach Washers and by orders for a number of new or expanded Recausticizing Systems.

**GENERAL METALLURGICAL** — Applications of the DSM Screen, first introduced in 1956, continued to grow in virtually every field we serve. One of the most promising has been magnetite recovery in heavy media cyclone plants on the Mesabi Range. Also new is the swing-type agitator for the American Filter — a development particularly applicable to filtration of heavy metallurgical slurries.

Following the trend noted in previous years, widespread acceptance of the Slurry Mixer by the cement industry and the Thickener — American Filter combination by the coal industry continued again last year. In Germany, France, India and Australia flue dust clarification and recovery contributed materially to our business and in Canada a substantial volume of Dorr-Oliver-Long shaft equipment and mine cars was purchased for underground mines.

**PLANT ENGINEERING** — At the year's end, design of a granular fertilizer plant for India and sections of a new Cuban nickel recovery plant were partially completed, and construction of three D-O designed phosphoric acid or fertilizer plants was progressing in Venezuela, England and Montana. During the year a 200,000 ton per year triple superphosphate plant in Florida and a Norwegian phosphoric acid installation were put into operation and brought up to design capacity in near record time.

**FLUOSOLIDS SYSTEMS** — Also in the fertilizer industry two western producers ordered the first FluoSolids Systems to be used for calcination of phosphate rock. Designed to handle a total of 1,500 tons per day, these installations were the direct result of successful field tests using a portable fluidized bed pilot plant. During the year other FluoSolids Systems were ordered to dry limestone and blast furnace slag in the U. S., roast copper matte in Belgium, calcine clay in Scotland, decompose copperas in England, and roast pyrite for a Japanese paper mill and an Italian sulfuric acid manufacturer.

The largest FluoSolids System for fine coal drying, handling over 600 tons per hour, went into operation during the third quarter at a new eastern preparation plant, and construction is nearing completion on a second similar, but smaller, installation. In the realm of unusual applications is a unit drying a highly-corrosive chlorinated hydrate at an eastern chemical plant.

**WATER TREATMENT** — In the southwestern United States the DorrClone Classifier has been used with notable success for the desanding of municipal well water supplies. For small plants the PeriFilter System with a single pre-treatment unit and split filter provides economical unitized water treatment.

Major expansions of the Louisville, Kentucky and Fort Worth, Texas treatment facilities will be D-O equipped as will new municipal plants at Springfield, Ohio; Peoria, Illinois; and Delhi, India. New industrial treatment installations will serve pulp mills in South Carolina, India and Venezuela and an Indian fertilizer plant.

**PETROLEUM** — Another modification of the familiar DorrClone Classifier is the Clay-Jector, latest development for control of drill mud weights. Noteworthy economies are possible using this unit which mechanically rejects undesirable drilled solids while recovering valuable barites for reuse.

**CHEMICAL** — A substantial amount of D-O equipment of all types has been incorporated into the unique flowsheet of a new astrakanite recovery plant in the Chilean nitrate fields. In Germany and the United States, Horizontal Filters have been widely applied to dewatering and washing of fine organics as well as highly corrosive inorganics, and around the world filters of both standard and special construction were ordered for an almost endless variety of services.

**FOOD PRODUCTS** — A mid-western producer has ordered twelve centrifugals of three basic types for washing and concentrating soya protein solids. Last year the largest U. S. corn starch producer put into operation a Merco-DorrClone starch washing system, and in 1958 the first DorrClone germ separation station in the same industry will go on stream. Also in centrifugals, a smaller model of the Mercone Screening Centrifuge is now available for intermediate or small scale operations.

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With several years of expansion and enormous activity behind us, the current business plateau provides a much needed opportunity to consolidate and catch our breath. The real challenge will be to increase the spread between income and outgo through more efficient operation — while accelerating the rate of our technological advances. I am confident we can, and will, do both.

J. D. Hitch, Jr.
*President*

*November 18, 1957*

FluoSolids, DorrClone, PeriFilter and RapiDorr T.M. Reg. U. S. Pat. Off.

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# SUGAR y AZUCAR

*Volume 53, No. 1 January, 1958*

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**COVER** *Starting it's 53rd year of publication* SUGAR Y AZUCAR—formerly SUGAR *and* EL MUNDO AZUCARERO—*begins its second year of publication as a bi-lingual monthly publication devoted to the world sugar industry. The publisher, the editor and the staff take this opportunity to wish sugar men all over the world "Feliz Año Nuevo."*

**CUBIERTA** *En su 53° año de publicación,* SUGAR *y* AZÚCAR—*anteriormente* SUGAR y EL MUNDO AZUCARERO—*comienza su segundo año de publicación como una revista mensual bilingüe dedicada a la industria azucarera mundial. Los editores, el director y el personal aprovechan esta oportunidad para desear a los azucareros en todo el mundo un "Happy New Year."*

*Publisher,* **MONA PALMER**
*Editor,* **E. W. MAYO, JR.**
*Assistant Editor,* **JULIA McGRAW**
*Editor, Spanish Section,* **JOSE M. PENA**
*Advertising Manager,* **R. E. SLIMERMEYER**

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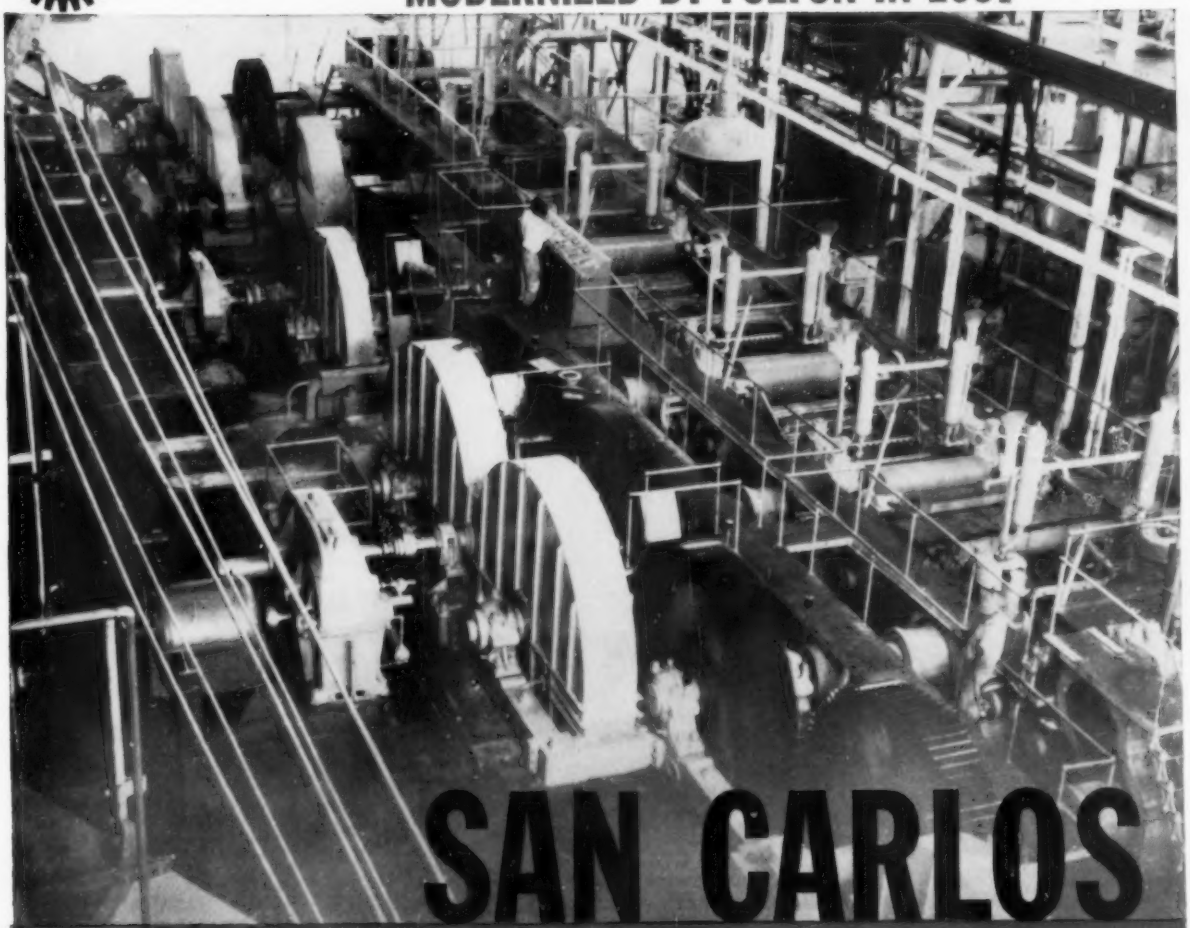
# BUILT BY FULTON IN 1918
# MODERNIZED BY FULTON IN 1957




ECUADOR

. . . another example of how Fulton can convert your old mills into a modern, efficient tandem.

At Ingenio San Carlos . . .

Fulton added two new milling units to this 66-inch tandem . . . increasing number of rolls from 14 to 20.

Fulton converted the tandem to steam turbine drive with central control for efficient operation.

Results: Capacity was increased to 4000 metric tons of cane per day . . . with improved extraction.

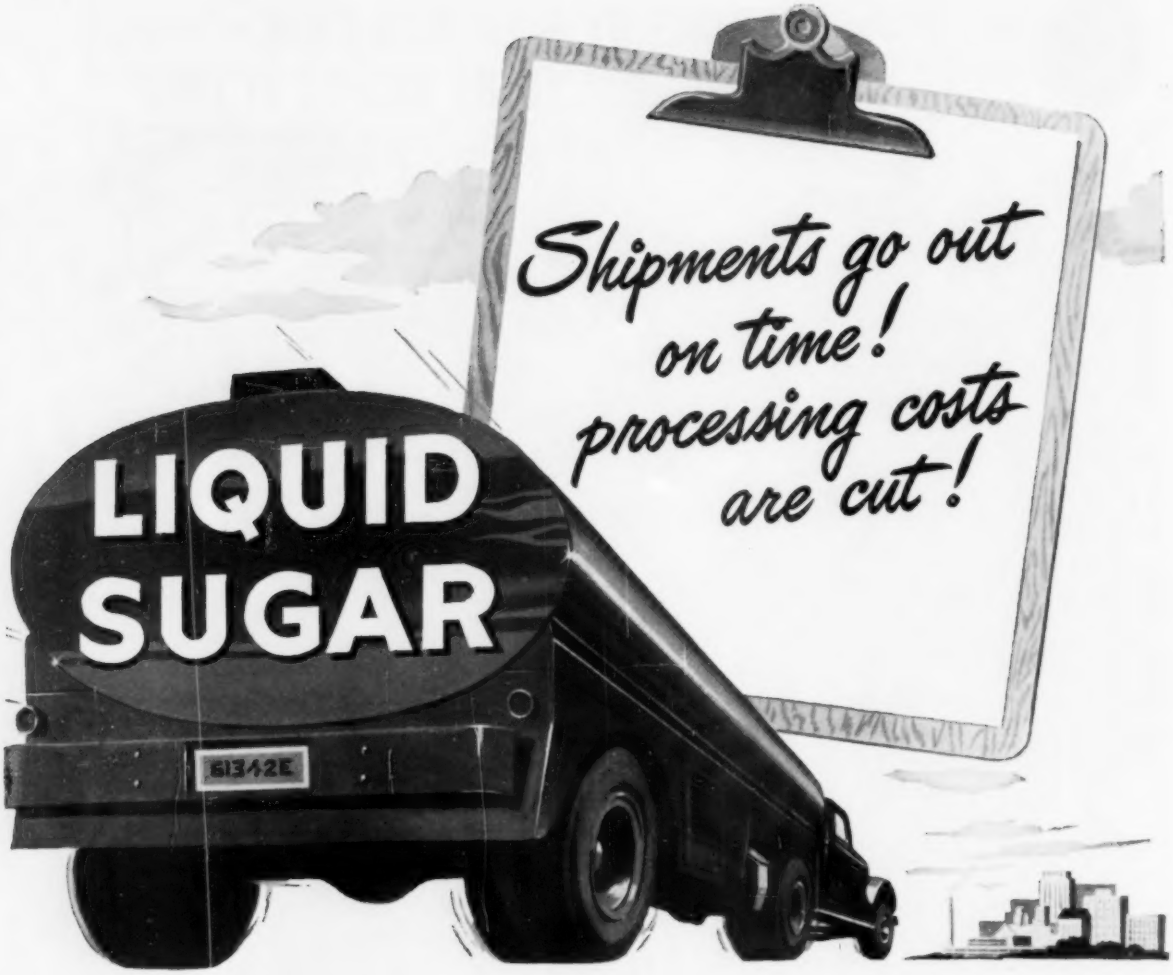
*For your Modernization Plan— Consult your Local Fulton Representative or Write Fulton*

For more profits per ton of cane the answer is always . . .

**FULTON IRON WORKS CO.**

St. Louis 10, Missouri, U.S.A.

Ingenio San Carlos, Ecuador




YOU SAVE both time and money when you clarify sugar liquors with Celite* diatomite filter aids. Save time because Celite filtration lets you combine $P_2O_5$ lime defecation, decolorization and clarification *all* in one operation (and insures you of outstanding color removal and brilliant clarity, too). Save money because you use your existing mixing tanks and filters and reduce decolorizing vegetable carbon consumption. In addition, in bone char refineries, char filter loads are also reduced when Celite filtration is used.

Celite also gives you important advantages over other diatomites. First, its lower wet density provides greater filter surface coverage . . . six bags do the work of seven bags of other diatomites. Second, you get more consistent results because Celite is more uniform. Each bag is mined and processed at the world's largest and purest commercial diatomite deposit . . . and sped to you direct or through J-M's nationwide warehouse network.

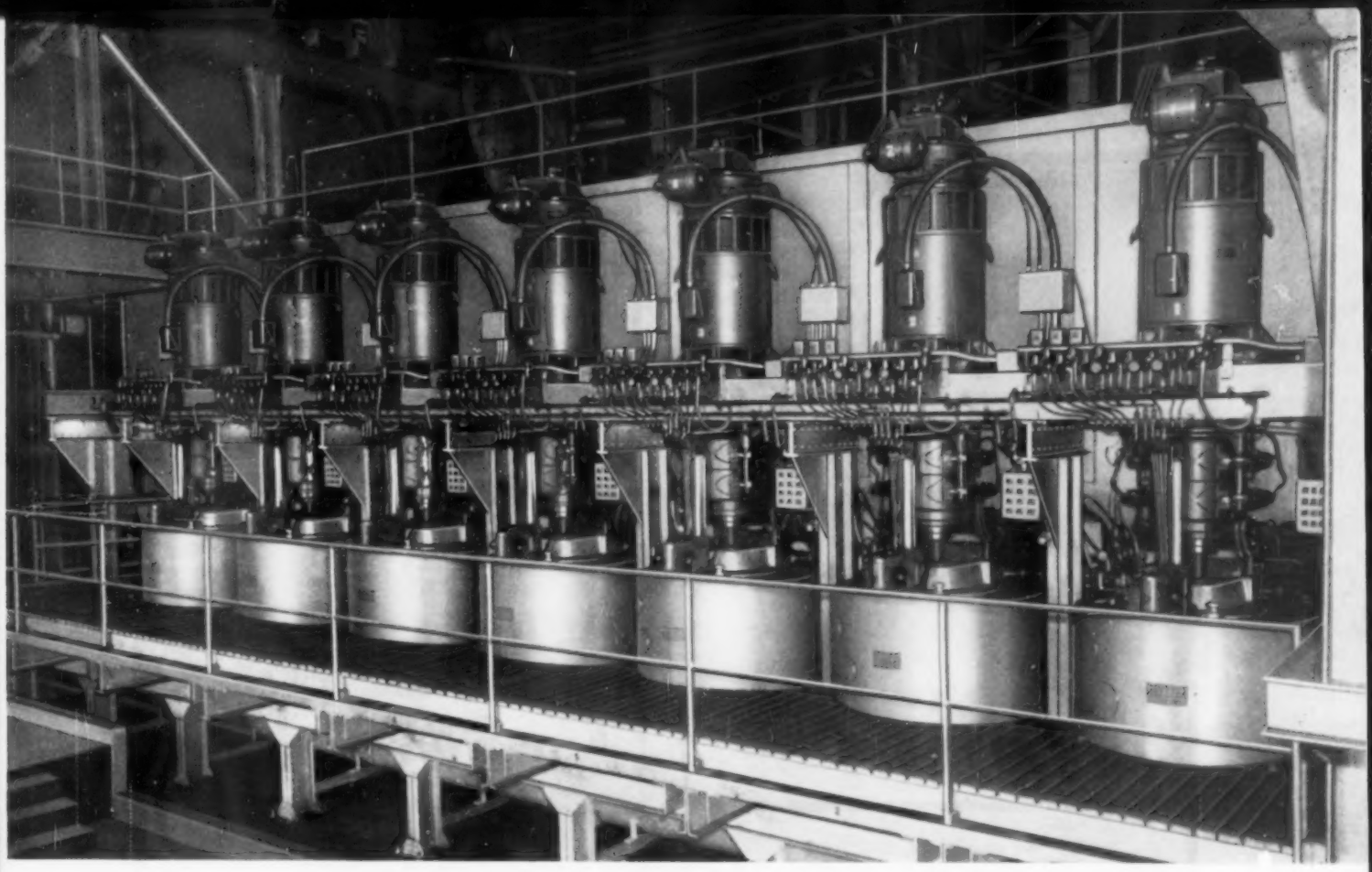
JOHNS-MANVILLE JM PRODUCTS

For more information on how Celite filtration can save you time and money and give you better filtration results, call your nearby Celite engineer or write Johns-Manville, Box 14, New York 16, N.Y. In Canada, Port Credit, Ontario.

**Johns-Manville CELITE**
**diatomite filter aids**

# when you filter with CELITE

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products



2522

Photo of seven 48" x 30" G-8's used for A & B massecuites at Central Mercedita.

# Central Mercedita

## The First Completely Automatic Centrifugal Battery in Puerto Rico

**FEWER MACHINES**

Twelve machines replaced, yet capacity increased.

**BETTER WORK**

All sugar washed to high purity for direct refining without affination.

**COMPLETELY AUTOMATIC**

Automatic loading, plowing, and recycling. One attendant — no operators.

That's what Central Mercedita accomplished when the new Western States G-8 Centrifugals were installed.

Another page in our book of experience —

ROBERTS STEVENS

The WESTERN STATES MACHINE COMPANY
HAMILTON, OHIO, U.S.A.

— This experience is available to you.

# for Unloading..

Because the new model HA "PAYLOADER" tractor-shovel is fast, flexible and efficient for unloading boxcars, more and more handlers of sugar and other loose, dry materials now specify that shipments be made in bulk at substantial savings in freight rates and handling costs.

It handles larger loads and delivers more tons per hour than heavier machines with bigger engines, yet has a smaller turning radius for better maneuverability in and around boxcars.

The 40-degree tip-back of the bucket at ground level permits the operator to get and hold big loads close and low. The hydraulic load-shock-absorber, a standard equipment feature, makes it possible to carry and move more material with less spillage, faster, with better stability and greater safety.

Whether you want to load or unload boxcars or do stockpile work, this new HA "PAYLOADER" enables the same operator to handle from 50 to 100% more material according to actual user reports. Its rated carry capacity is 2,000 lbs.

All "PAYLOADER" models are sold and serviced by local Hough Distributors . . . in the overseas market by the construction equipment distributors of International Harvester Export Company.

I-A-5

**PAYLOADER®**
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

# for Sweeping..

The same model HA "PAYLOADER" tractor-shovel can be quickly transformed into a pick-up sweeper to clean floors, aisles and driveways. This sweeper attachment mounts on the bucket and has an hydraulic motor to power this rotary broom.

It sweeps a four-foot swath right into the bucket and when the bucket is full, it can be raised, carried and dumped into a bin, pile or truck as desired.

Attaching or detaching the sweeper takes only a few minutes. Some users who need the machine for bulk handling duties during the full daytime shift, recommend mounting and using the sweeper "after-hours" or during night shift operation.

The model HA and most of the other "PAYLOADER" tractor-shovel sizes offer a choice of engines—gasoline, diesel or LPG. Literature on the complete line of "PAYLOADER" machines (sizes up to 9,000 lb. carry capacity) and their attachments, and the name of your Distributor, is yours for the asking. The Frank G Hough Co., 881 Sunnyside Avenue, Libertyville, Illinois, U.S.A.

I-A-5

**PAYLOADER®**
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THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

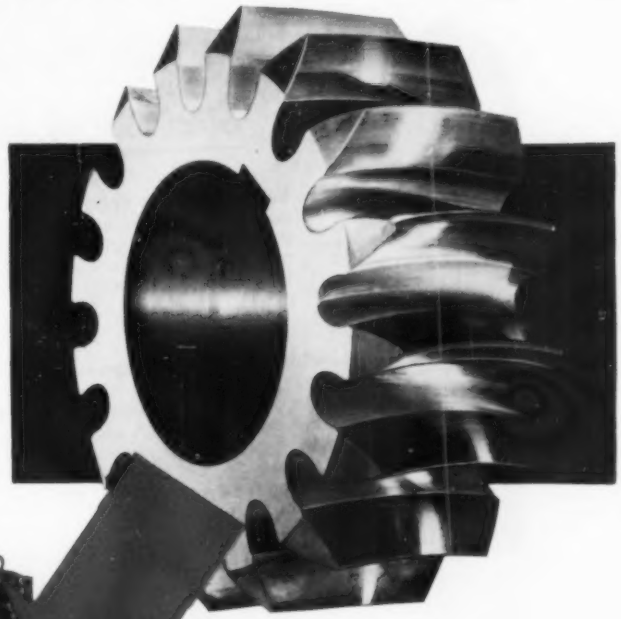
# BMA - SUGAR CANE MILLS

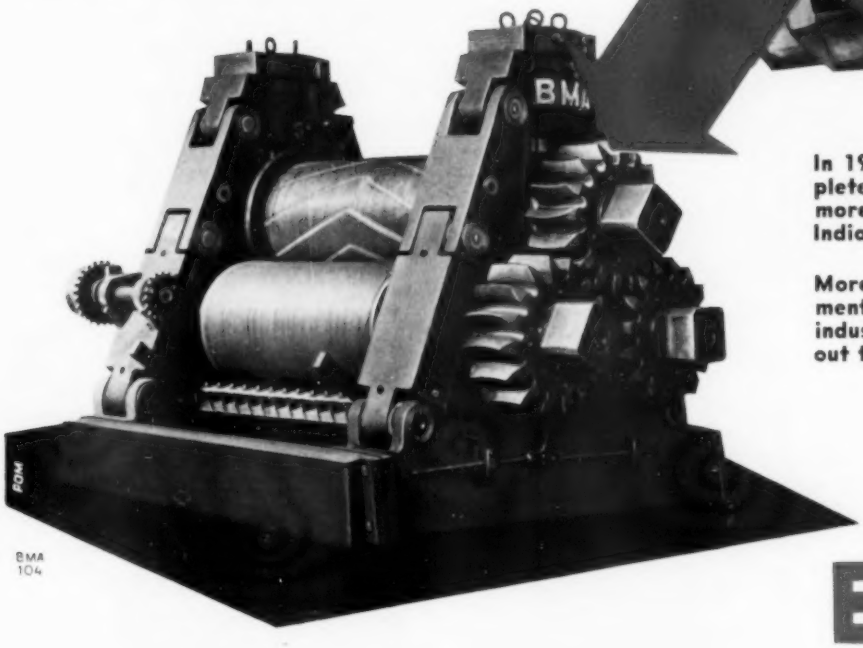
are manufactured in conformity with the latest technical experiences and ensure greatest economy and least wear.

An interesting feature is represented by the patented arc-toothed crown wheels.

Here some characteristics:

- **No tooth-edge deformation as load always at the centre of the tooth even in inclined position of top roller**
- **Higher moments of resistance by arc shape**
- **Accurately machined involute teeth**
- **Flame-hardened tooth profiles for highest load**
- **The long teeth overlap over wide range of roller lift and mesh properly even by maximum roller wear**






BMA 104

**In 1956-57 we delivered 3 complete cane sugar factories and 5 more are under construction for India**

**Moreover machines and equipment for the cane and beet sugar industry were delivered throughout the world**

# BMA

## BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG / WESTERN GERMANY

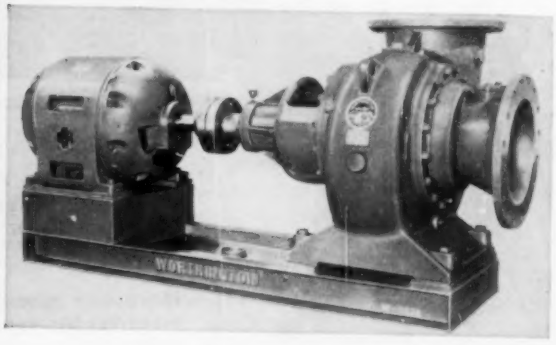
Complete factories for

**Cane sugar – Beet sugar – Refined sugar – Alcohol – Butanol and Acetone, Nutritive-, Fodder- and Baker's Yeast**

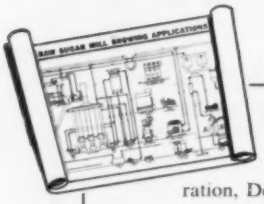
# Solve Your Irrigation or Drainage Problem with Worthington Specialized Equipment

**Vertical Turbine Pumps** — newly designed, most complete line of vertical turbine pumps. High performance, simplicity, reliability, efficiency and top quality. Sizes range from 6" up; capacities from 50 to 3000 U.S. gpm. Water or oil lubrication.

**Worthington Centrifugal Pumps** — Types L and M — for applications requiring large capacities of water against wide range of operating heads. Sizes from 8" to 84" discharge and capacities from 1500 to 225,000 U.S. gpm. Most pumps available in several different styles, such as horizontal, vertical, dry pit or wet pit, horizontal or bottom suction, closed or open impellers, clockwise or counterclockwise rotation.




**Self-Priming Centrifugals** — portable, multi-purpose gasoline-engine or motor driven pump. Self contained. For capacities up to 500 U.S. gpm, total heads up to 110′ in standard sizes 1½" to 2". Ideal for such applications as irrigation, drainage, de-watering, sump service, etc.




**FREE!** . . . 2-color, diagrammatic flow chart showing typical applications of Worthington equipment in a sugar mill. For your copy, or for information on sugar mill equipment, write to Worthington Corporation, Department O.C., Harrison, N. J., U. S. A.

**WORTHINGTON**

**The sign of value around the world**

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**BRAZIL**
*Worthington S.A. (Maquinas), Rio de Janeiro*

**COLOMBIA**
*Worthington Limitada, Bogota*

**MEXICO**
*Worthington de Mexico, S.A., Mexico, D. F.*

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*Cia. General de Comercio y Mandato, Guayaquil*

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*Quinonez Hermanos, S.A., San Salvador*

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*Emilio Selle, Guatemala City*

**HAITI**
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**HONDURAS**
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*Equipos Mecanicos, S.A., Mexico, D. F.*
*Equipos Mecanicos del Norte, S.A., Monterrey, N. L.*

**NICARAGUA**
*Casa Comercial McGregor, S.A., Managua*

**REPUBLIC OF PANAMA**
*Guardia & Cia., S.A., Panama*

**PARAGUAY**
*Interpar, S.A., Asuncion*

**PERU**
*A. y F. Wiese, Lima*

**PUERTO RICO**
*F. A. Ortiz & Co., San Juan*

**SURINAM**
*J. F. D. Haenen Co., Ltd., Paramaribo (Netherlands Guiana)*

**TRINIDAD**
*J. N. Harriman & Co., Ltd., Port-of-Spain*

**URUGUAY**
*Horacio Torrendell, S.A., Montevideo*

**VENEZUELA**
*Mata Sifontes, S.A., Caracas*
*CUTISA, Maracaibo*

**VIRGIN ISLANDS**
*F. A. Ortiz & Co., San Juan (Puerto Rico)*

## THE WORLD'S PRODUCTS GO INTO BETHLEHEM STEEL

Bethlehem requires imported raw materials from 41 countries around the globe.

Chrome, tin, tungsten, manganese, fluorspar, hemp, rubber, paper pulp and chemicals are just a few of the items that either go into the steels we make or are used in the plant operations.

As additional millions of tons of steel are produced by Bethlehem, imports of raw materials increase, too . . . making Bethlehem an even larger customer in many markets around the world. Bethlehem plays an important role as both seller and buyer in world trade. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U. S. A. Cables: "BETHLEHEM, NEWYORK."

BETHLEHEM STEEL

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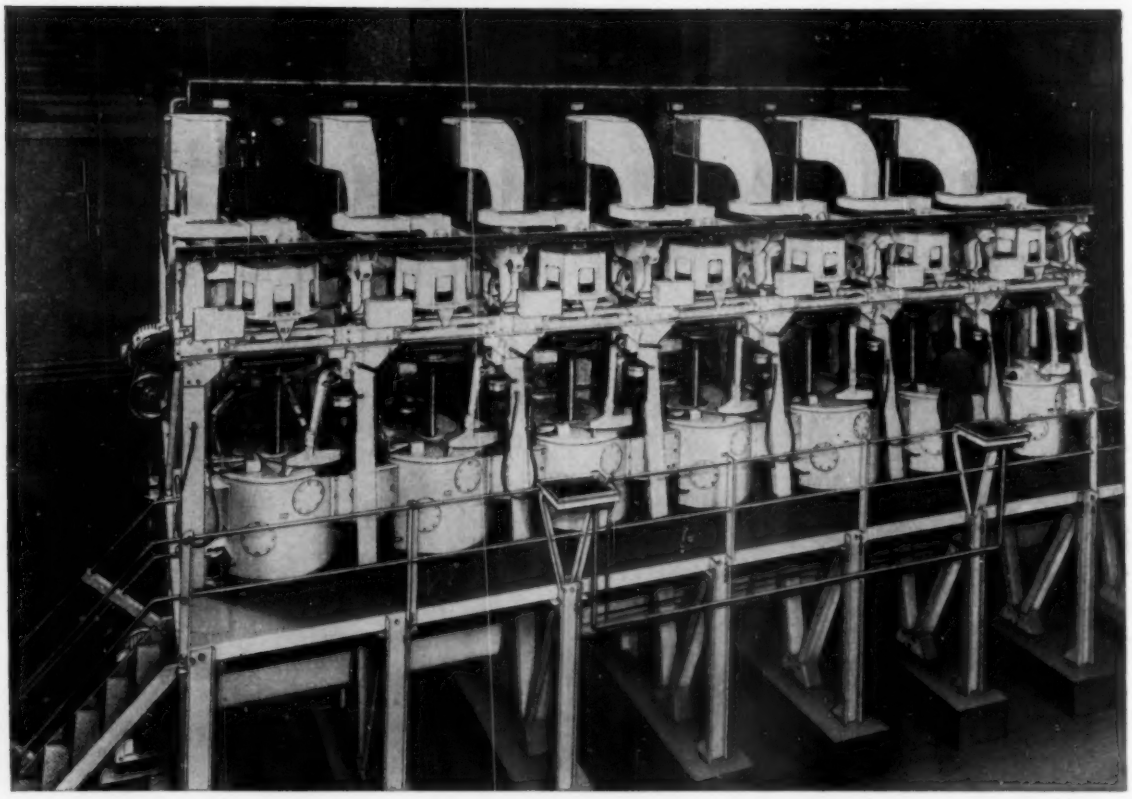
In Cuba: Bethlehem Steel Export Company, S. A.
Ambar Motors Building, Menocal Avenue at 23rd, Havana




## *constant reliability + performance*

When expanding, your first consideration is profit. Profit can only be maintained by installing centrifugals which ensure constant reliability and performance. These are two of the reasons why you should install BROADBENT.

In addition these centrifugals are powered by BROADBENT MOTORS designed for centrifugal duties and all accessories and controls are built to last, eliminating costly shut-downs. It is more profitable and easy to expand with . .

# BROADBENT CENTRIFUGALS

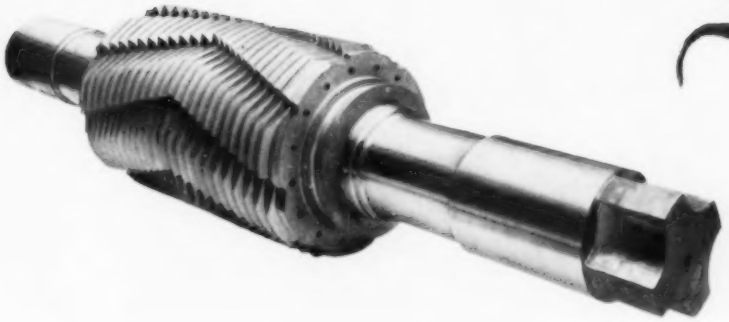
THOMAS BROADBENT & SONS LTD., CENTRAL IRONWORKS

HUDDERSFIELD · ENGLAND · Tel: 5520/5. Grams: 'BROADBENT'

*•Represented in most sugar producing areas*

Bauduin

rough surface of the shell enlarged



## Conqueror of the sugar cane

A title well merited by the STORK-WERKSPOOR Mill Roller

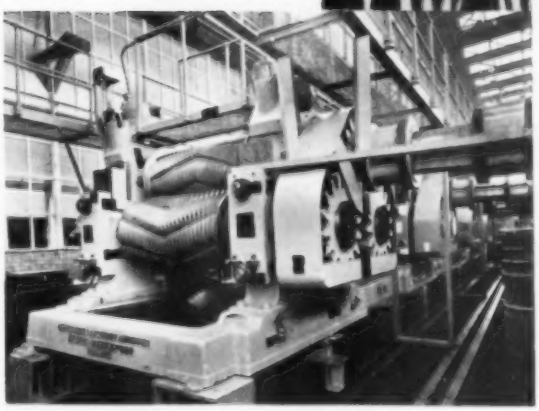
Shell:

- cast under rigid laboratory control.
- special material evolved by years of research.
- coarse, rough texture gives excellent gripping of cane.
- permanent wear resisting properties for long life.

Shaft:

- forged from high grade steel.
- machined to exact dimensions.

For excellent service and durability it will pay you to equip your mills with STORK-WERKSPOOR MILL ROLLERS.

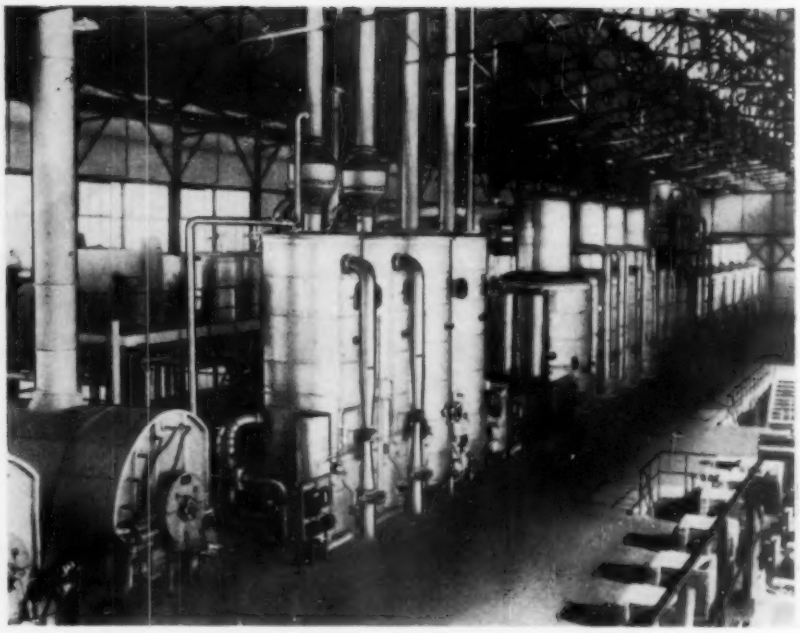


**STORK**
HENGELO

**WERKSPOOR**
AMSTERDAM

FOR ALL SUGAR MACHINERY APPLY TO GEBR. STORK & CO N.V. - HENGELO - NETHERLANDS

# 18



*Inside view of the Malatya Sugar Mill (Turkey)*

## SUGAR FACTORIES ERECTED THESE LAST 10 YEARS

### BEET

| | T/day |
|---|---|
| **France** | |
| Artenay | 1200 |
| Cagny | 800 |
| Corbeilles-du-Gatinais | 1200 |
| Origny-Ste-Benoite | 900 |
| St-Leu-d'Esserent | 1000 |
| **Algeria** | |
| Mercier-Lacombe | 300 |
| **Turkey** | |
| Kayseri | 1800 |
| Malatya | 1200 |

### CANE

| | T/day |
|---|---|
| **Bolivia** | |
| Guabira | 1000 |
| **Brazil** | |
| Jacarezinho | 600 |
| Matosinhos | 800 |
| Vassununga | 1000 |
| **Uruguay** | |
| El Espinillar | 1200 |
| **Venezuela** | |
| Ureña | 700 |
| **Madagascar** | |
| Ankaratra | 2500 |
| **French Congo** | |
| Niari | 1150 |
| **Belgian Congo** | |
| Uvira | 1200 |
| **Thaïland** | |
| Supanburi | 1500 |

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# All three sugar daddies are sweet on DARCO®

Cane, beet or corn, the sugar you make can be refined to highest standards of quality at minimum cost, when you use DARCO activated carbon.

**WANT PURITY?** DARCO's high adsorptive power assures thorough removal of colors, odors, and other impurities. DARCO is highly pure itself, too . . . won't introduce contaminants.

**WANT EFFICIENCY?** The DARCO process requires minimum labor or equipment. DARCO has high bulk density; gives long filter cycles.

**WANT HIGH YIELDS?** DARCO takes out colloids that interfere with crystallization, and assures maximum sugar in the bag.

**WANT ECONOMY?** You'll save time, labor, steam and carbon by using DARCO. It's the choice of leading refiners everywhere.

Write to Atlas today for data on the DARCO process, and for recommendations on how it can be applied in your refining operations.

CHEMICALS DIVISION
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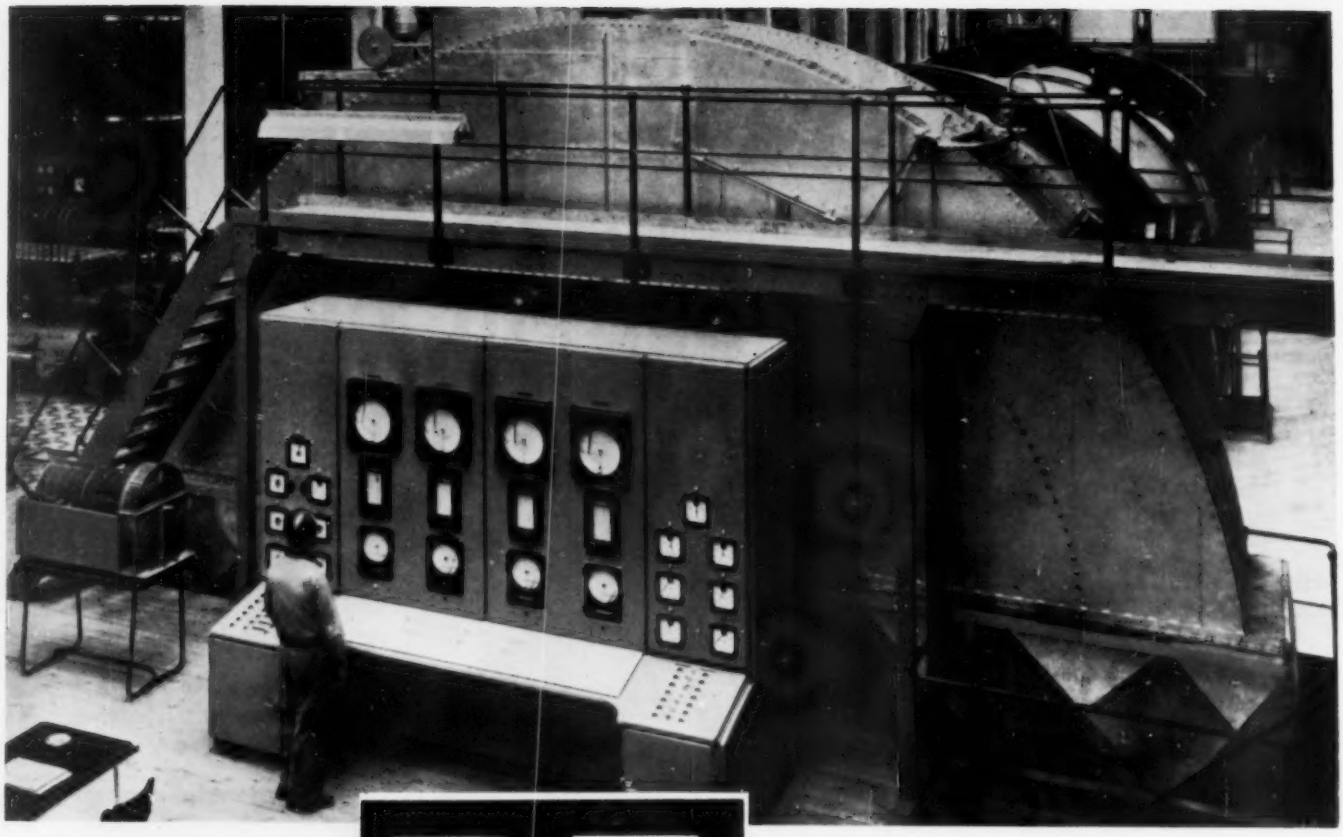
*In Canada:* Atlas Powder Company, Canada, Ltd.
Brantford, Ontario, Canada



R.T. Continuous Diffuser with capacity of 3000 tons of beets per day.

# R.T. CONTINUOUS DIFFUSER

*The only diffuser which includes all the following advantages:*

1. Ideal flexibility of operation, with perfect regularity of results; a temporary shutdown, even a long one, has no undesirable effects.
2. Perfectly controlled counter-current throughput of juice and cossettes; there is no channeling, nor stagnant zones.
3. Retention time of the juice is only half as long as that of the cossettes; there are no undetermined losses during the time needed for thorough extraction of the sugar.
4. Losses of sugar in pulp, with equal juice drafts, are the least.
5. The internal structure of the diffuser comprises no moving mechanical parts.

**Societe Sucriere D'Etudes et de Construction**

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# BUFFALO-SQUIER NON-CLOGGING CENTRIFUGAL PUMPS

for uninterrupted flow of "raw juice"

- Over-size construction guarantees extra years of trouble-free pumping.
- Eliminates need for awkward juice strainer and trash elevator.
- Impeller shrouds eliminate wearing plate on suction side.
- Enclosed type impellers for higher efficiency.
- Unique diagonally split shell design permits full maintenance without disturbing piping.

THE SQUIER CORP.

ENGINEERS AND MANUFACTURERS

BUFFALO, NEW YORK, U.S.A.

# A PROVED* SUCCESS

# 'Mirrlees' STEAM TURBINES

## for mill extensions and new factories

Extract from the Managing Director's Statement (16th August 1957) to the Shareholders of The Natal Estates Ltd. (Reproduced by permission)

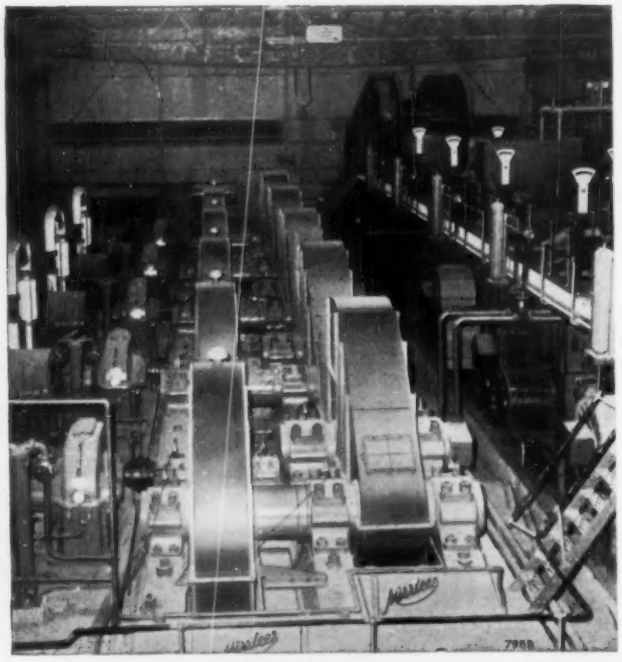
*The Crusher Turbine Drive replaces the electric drive supplied by MIRRLEES in 1934.

*

The mill extraction figure recorded 93.71 per cent. in 1956 and as envisaged in my statement last year, practical steps have now been taken to improve milling results by the installation of a steam turbine driven sixth milling unit, thus increasing the milling train to one of 21 roller (including the crusher). A flexible steam turbine drive has also been installed to operate the front crusher unit and will add to the general efficiency. These new units which were brought into service on 8th. May, 1957, are operating satisfactorily and have increased the mill extraction for the current season up to the time of writing to 94.80 per cent. compared with 93.71 per cent. for the corresponding period in the 1956 season.

This is only one of the many successful installations using Mirrlees Steam Turbines—and more recent figures show even greater improvement:

| | BEFORE—WEEK ENDING 27/10/56 | AFTER—WEEK ENDING 26/10/57 |
|---|---|---|
| TONS CANE CRUSHED PER HOUR | 158.95 | 168.35 |
| INBIBITION % CANE | 37.5 | 33.29 |
| FIBRE % CANE | 16.13 | 16.96 |
| MILL EXTRACTION | 93.8% | 95.16% |



*Extract From "New Commonwealth"*

**Ceylon's first sugar cane factory**

*Colombo.*

THE Ceylon Gal Oya Development Board recently signed a contract with the Mirrlees Watson Co. Ltd., a Scottish firm, totalling Rs. 19 million for the construction of the first sugar cane factory in the island. Under the terms of the contract the firm will construct the buildings, supply the machinery and install it in conjunction with its local agents, Brown & Co. Ltd.

Local industrialists believe that the Government could not have made a better choice in handing over the contract to the Mirrlees Watson Co. Ltd. because of its experience and record in sugar cane machinery. The company has equipped several factories throughout the world, including no less than 50 in India where its operations began in 1874.

**MIRRLEES are the only British makers of Sugar Machinery who also design and manufacture Steam Turbines for Mill Drives. Over 40 Mirrlees Turbine driven plants are operating with good results throughout the world.**

TAKE ADVANTAGE OF THIS UNIQUE EXPERIENCE. SPECIFY MIRRLEES STEAM TURBINES FOR MILL DRIVES.

**THE MIRRLEES WATSON COMPANY LIMITED**

***Head Office and Works:*** **Scotland Street, Glasgow, Scotland**
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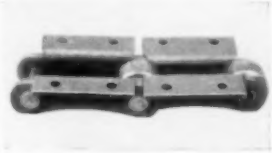
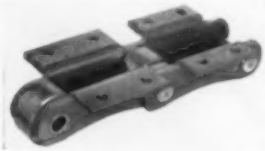
# Durable Link-Belt SS chains bring low-cost efficiency to cane carriers

**SS-600-K2 CHAIN** is the strongest cane carrier chain for its weight. Has 6-in. pitch—average ultimate strength of 100,000 lbs. Selected steel sidebars are accurately machined for correct pitch and hole size. Rollers are machined for free-rolling and case-hardened for long life.

**SS-96-K2 CHAIN** — 6-in. pitch — has 47,000-lb. average ultimate strength, tight-fitting steel pins and bushings, case-hardened rollers.



**SS-996-K2 CHAIN** — 6-in. pitch — has average ultimate strength of 70,000 lbs., alloy steel heat-treated pins, case-hardened rollers and bushings.



**SS-800-K22 CHAIN** — 8-in. pitch — has 125,000-lb. average ultimate strength, "full-round" alloy steel heat-treated pins, case-hardened bushings and rollers.

### Complete line offers choice for specific capacity requirements

For low cost and long, trouble-free operation, choose the right chain for your cane carriers from the complete Link-Belt line. Properly proportioned for maximum average ultimate strengths ranging from 47,000 to 125,000 lbs., Link-Belt Class SS chains assure significant cost savings for all carrier capacities.

Manufacture and assembly of Link-Belt Class SS chains are closely controlled to provide extra wear resistance for severe cane carrier service. For example, rollers are accurately machined to assure free-rolling action, and are properly case-hardened for longer life. In addition, pins and bushings are carefully sized for proper press fit in accurately machined holes of sidebars. Bushings provide a smooth bearing surface for rollers and pins.

Alloy steel pins are heat-treated and are cadmium plated to inhibit corrosion. Pins are available drilled for pressure lubrication which results in longer chain life under this severe service.

## Sprockets and slats available for new installations and replacements

Link-Belt's complete line of cast and cut tooth sprockets permits correct matching with every type and size of chain. Split or solid arm or center plate wheels are available in gray iron for relatively light, clean service . . . cast steel for severe shock and high torque applications . . . Flint-Rim for heavy loads and extremely abrasive operating conditions. Accurately cast and ground teeth assure proper chain contact.

Link-Belt also offers cane carrier slats in a broad range of types, metals and sizes—bolted or riveted designs—for new installations or replacements. All are designed to assure rigidity and minimum leakage of knifed cane.

**Choice of 5 Slat Styles**

### Link-Belt chains for sugar service—

*HERE ARE JUST A FEW:*

*Class C combination malleable and steel chains* for feeding tables . . . *Class SS and LXS steel roller chains* for main cane carriers, bagasse carriers and for heavy-duty drive service . . . *Class 1100 malleable and Promal chains* for short center and light load bagasse conveyors . . . *Class 900 malleable, Promal, bronze and stainless steel chains* for intermediate cane carriers . . . *Class 400 pintle malleable or Promal chains* for juice strainers. Let Link-Belt help select the right chain for your needs.

For facts, call your Link-Belt representative or write direct.

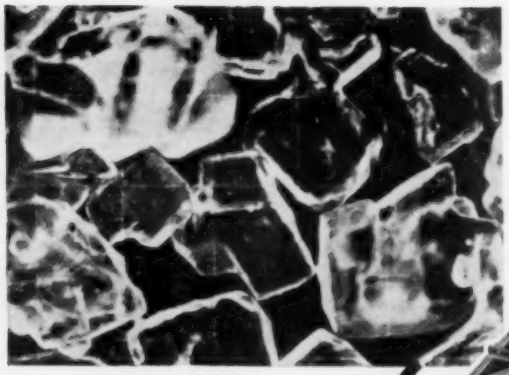
**LINK-BELT**

**CHAINS AND SPROCKETS**

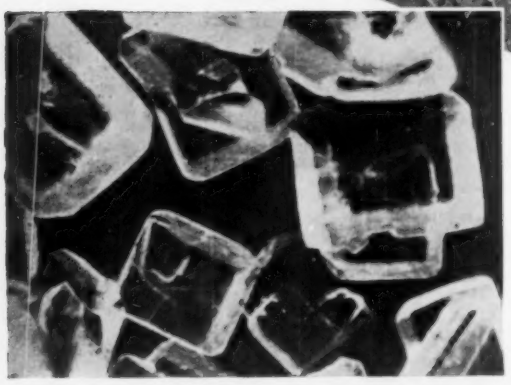
14,635

**LINK-BELT COMPANY:** Engineers • Manufacturers • Exporters of Machinery for Handling Materials and Transmitting Power • Established 1875. **EXPORT DIVISION:** 2680 Woolworth Bldg., New York 7, U.S.A. Cable Address: Linkbelt—New York • Representatives Throughout the World.

Bauduin



**Bigger and better crystals...**



with
**WERKSPOOR**
**Rapid Crystallizers**

STORK VERENIGDE MACHINEFABRIEKEN V·M·F NEDERLAND STORK • WERKSPOOR WERKSPOOR

*For Rapid Crystallizers please apply to Werkspoor - Amsterdam*

**SEVEN SIZES—½ to 50 HP—420 to 5 rpm—single and two double reduction ratios. Output torque ratings up to 31,500 lb-in.**

# FALK ALL-STEEL Shaft Mounted Drives

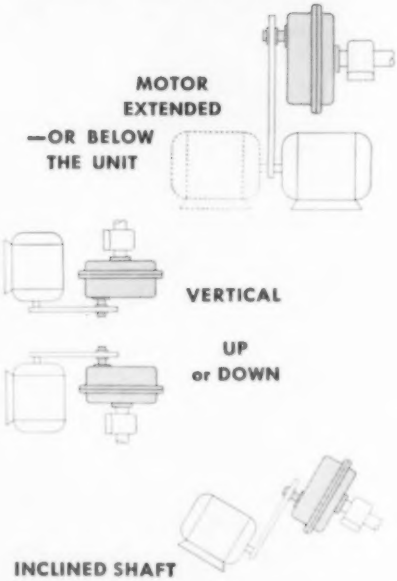
The photograph above typifies the way FALK Shaft Mounted Drives furnish the economical solution to problems of efficient speed reduction in a limited space. Within their rated capacities, these versatile reducers are designed to drive any machine and to fit any space requirement.

FALK Shaft Mounted Drives mount on the driven shafts and are connected by V-belt or chain to any convenient rotating power source. Unlimited choice of output speeds between 420 and 5 rpm is made possible by varying the ratio of driving sheaves or sprockets.

These units, with precision-cut gears of highest efficiency, use a minimum of power. They need no adjustable motor bases or slide rails; thus they save material. And, because they are readily available and easily installed or moved, they save time. Best of all, they are backed by FALK's unmatched experience in precision-gear manufacture.

Promptly available from factory and distributor stocks, from *coast to coast*. Ask your Falk Representative or Distributor for details—or write us for **Bulletin 7100.**

**A FEW OF THE MANY POSSIBLE DRIVING ARRANGEMENTS**




**THE FALK CORPORATION, 3001 W. CANAL ST., MILWAUKEE 1, WIS.**

Representatives and Distributors in Most Principal Cities

*Manufacturers of*

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
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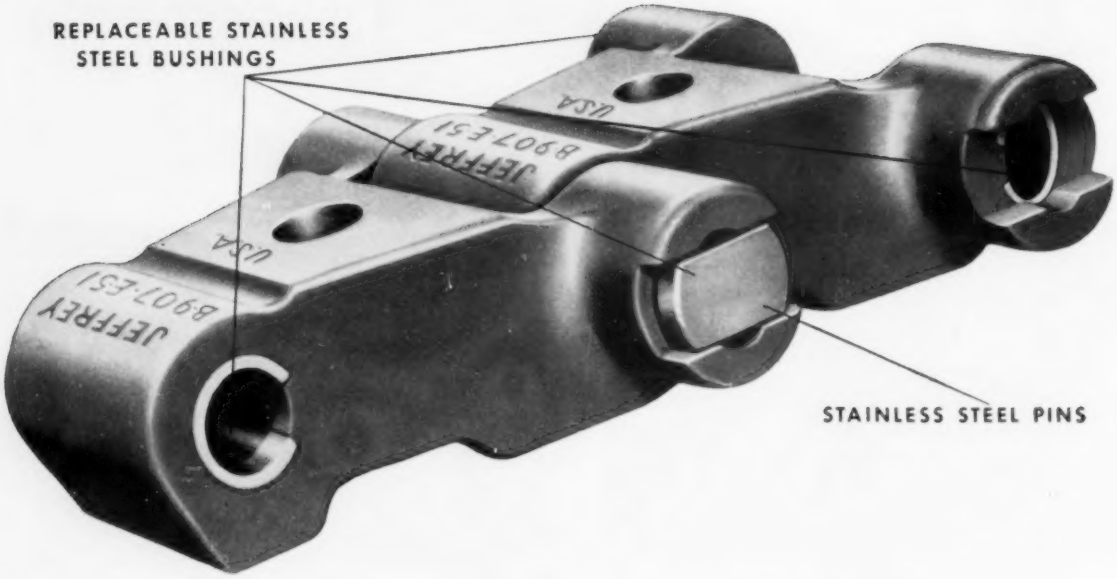
**FALK**

**...a good name in industry**




# NEW BUSHED CHAIN... Another advance in the Sugar Industry made possible with the

## JEFFREY B-907-E51 CHAIN

This new chain is interchangeable with your 907 chain . . offering longer life and lower upkeep.

The high strength, corrosion-resistant malleable iron and abrasion-resistant PERDURO chain so popular for intermediate carrier service is now offered to you with links bushed at both the open end and barrel end. This is the main difference from other chains.

You now get added advantages provided by renewable, stainless steel bushings and pins which resist wear and corrosion. Only wear on the link proper comes from sprocket contact.

Replacement of worn parts is easy with Jeffrey B-907-E51 . . . can be done on the job. Takes little time and new bushings are inexpensive, reducing downtime and operating costs.

Jeffrey's high manufacturing standards require the finest materials and workmanship. That's why it pays to install and replace with Jeffrey chain, sprockets and accessories. We can make shipment from stock.

JEFFREY

*Export Division*

**THE JEFFREY MANUFACTURING COMPANY**

**COLUMBUS 16, OHIO**

Refineries like these have found

# ANGOLA® SUGAR FILTERS BEST!

| *Customer* | *Location* | *No. of Filters* |
|---|---|---|
| Azucarera Merida | Merida, Venezuela | 2 |
| Central Santa Rosalia | Caracas, Venezuela | 1 |
| Central San Agustin | San Agustin, Cuba | 2 |
| Central Portugalete | Havana, Cuba | 4 |
| Central Porfuerza | Cardenas, Cuba | 3 |
| Central Roig | Yabuca, Puerto Rico | 2 |
| Central San Cristobal | San Cristobal, Cuba | 6 |
| Central Tanamo | Cayo Mambi, Cuba | 1 |
| Central Washington | Manacas, Cuba | 2 |
| Central Andorra | Artemisa, Cuba | 4 |
| Central Matilde | Chivacoa, Venezuela | 2 |
| Central Espana | Perico, Cuba | 1 |
| Central Santa Juana | Caguas, Puerto Rico | 4 |
| Ing. Pichichi | Guacari, Colombia | 2 |
| Ing. Mahuixtlan | Jalapa, Mexico | 1 |
| Jose Arechabala | Cardenas, Cuba | 1 |
| Western Sugar Refining Company | Mayaguez, Puerto Rico | 1 |

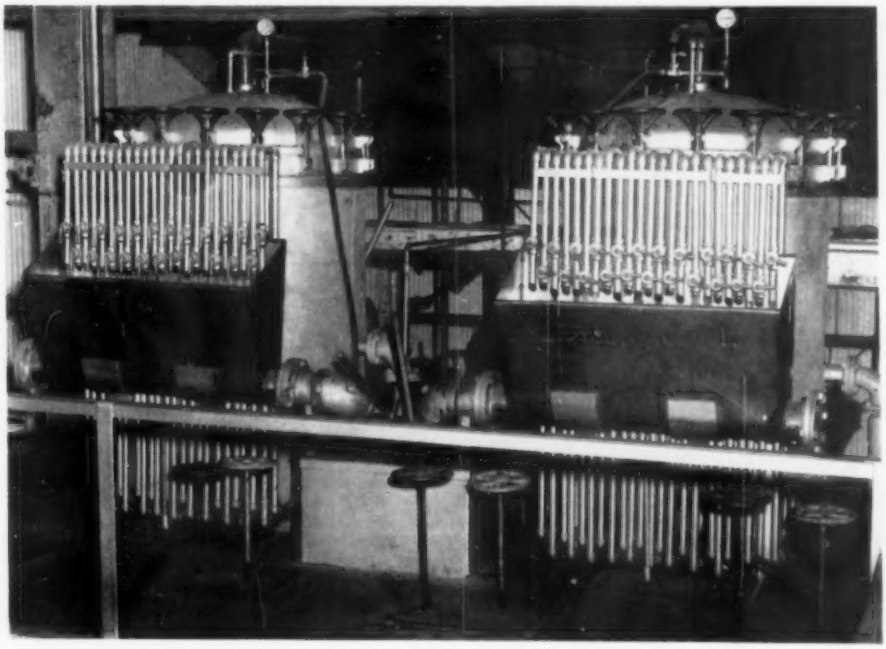
Listed here are some of the refineries in Central and South America who have purchased Angola filters. Angola filters are used all over the world because of their fine quality and long life.

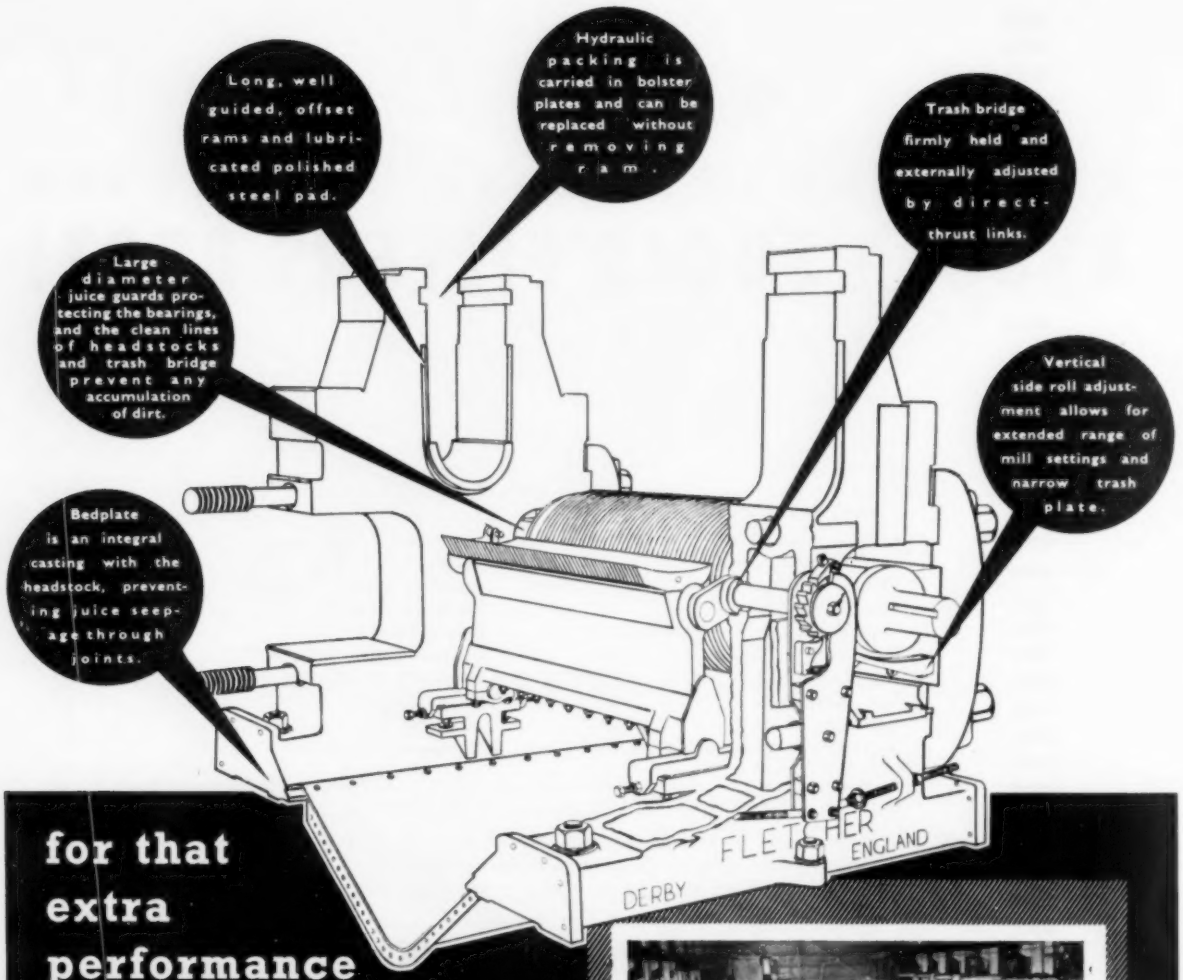
Angola filters provide high flow rates with maximum clarity at the lowest possible cost. Each leaf has a separate discharge and control valve, which provides complete control at all times. Angola filters are easy to operate and easy to clean. Specify Angola for the finest sugar filtration.

**THE DURIRON COMPANY, INC.** | ANGOLA, NEW YORK

*Represented by:* J. M. Sierra, Apartado 363, Havana, Cuba
Especialides Industriales, S.A., Apartado del Este 4376, Caracas, Venezuela

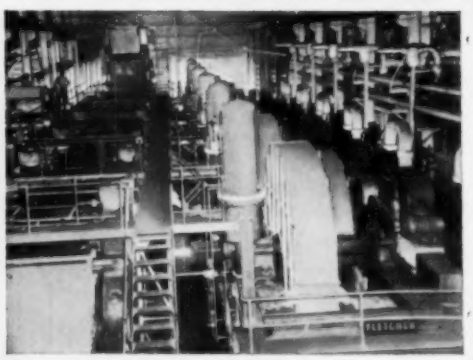
**ANGOLA FILTERS**






# for that extra performance these points count

Over a century's specialisation in the manufacture of sugar machinery has kept us in very close touch with the requirements of sugar factory engineers. That is why we believe that the Fletcher mill — designed from this experience — gives the most lasting and economical service in the world.



*18 roller 34" x 66" turbine driven FLETCHER mill tandem at Boca Chica, Dominican Republic.*

***Complete plant for the sugar industry***

**Cane knife Sets — Maxwell Shredder — Fletcher Mills — "Atlas metal" Mill Rollers — Maxwell Boulogne Liquid Scales — Fortier Clarifier — Sealed Downtake Evaporator — Centre Flow Pan — Fletcher Crystalliser — Amarilla Rotary Displacement Pumps for Massecuite and Viscous Liquids.**

FLETCHER

# FLETCHER *mills*

**GEORGE FLETCHER & CO LTD MASSON WORKS LITCHURCH LANE DERBY ENGLAND · GRAMS "AMARILLA" DERBY · PHONE DERBY 45817**

SUGAR

JANUARY, 1958

*A Russian Technical Report*

# BAGASSE PAPER IN CHINA

By A. J. Steiger

THE Peking Government plans a major expansion in the use of sugar cane bagasse for the production of newsprint and other types of paper, the Moscow trade paper "Bumazhnaya Promyshlennost" (Paper Industry) reports. With substantial quantities of cane and very little paper, Communist China is turning to sugar to supply this important product. Cane is preferred over bamboo, cotton stalks and other annual crops which are used for paper making in China's paper mills in addition to a minimum of wood pulp.

The Russian trade journal reports that the process used in paper making from bagasse was a Chinese development which is described by a Russian authority on paper making, S. P. Foteyev.

Harvest is carried on in late autumn and early winter and the bagasse is sorted into large, medium and small grades, bundled in packs of 55 to 132 lbs. and stacked according to classication. It is shipped by water, rail or road transport to the pulping mill where a three-month's supply is kept on hand in 500 and 1,000 ton stacks. The cane is weighed on arrival and again just before being processed; once each shift its moisture content is analyzed.

At the paper plant the bagasse is first put through a cleaning process in the preparatory department. Chopped into pieces not more than 1.18 inches long, it is screened and delivered to hoppers to be fed to digesters. Handled in two parallel flow lines with a capacity of 16 to 20 tons per hour, the bagasse cleaning system is illustrated in the accompanying diagram, Figure 1. The bagasse is evenly distributed by workmen on the conveyor (1) passing to feeder (2) which delivers it to cutter (3). Spring rolls (4) apply pressure to the bagasse. The steel blades on the cutter wheel, 6.5 ft. in diameter chop the bagasse. The cutter wheel is driven by an 80 to 100 kwt. electric motor turning up 220 to 230 rpm. The bagasse then passes to the hopper leading to the blower (5) and then to the cyclone (6) from which it funnels through a 12 in. pipe to dust separator (7). This separator consists of revolving screens arranged in tightly closed housings which are connected by pipes to blower (8). Air suction created between the screens and their housings facilitates dust removal. Spiral chasers revolving at 150 to 165 rpm inside the screens mix up and drive the chopped bagasse through the funnel into screw conveyor (10) which delivers a uniform flow to vertical dust extractor (11). In passing down through extractor (11) fine pieces of light husk and dust are separated from the bagasse by air currents stirred by fans (12). The screened material slowly settles in the dust extractor's conical bottom, and then goes to blower (13) for passage to a cyclone installed over the boiling shop hopper. The hopper can hold more than enough bagasse to charge the digester. In the cleaning process the bagasse loses 3 to 3.5% of its weight; 10 to 12 kwt.-hrs. of electric power are consumed per ton of cane.

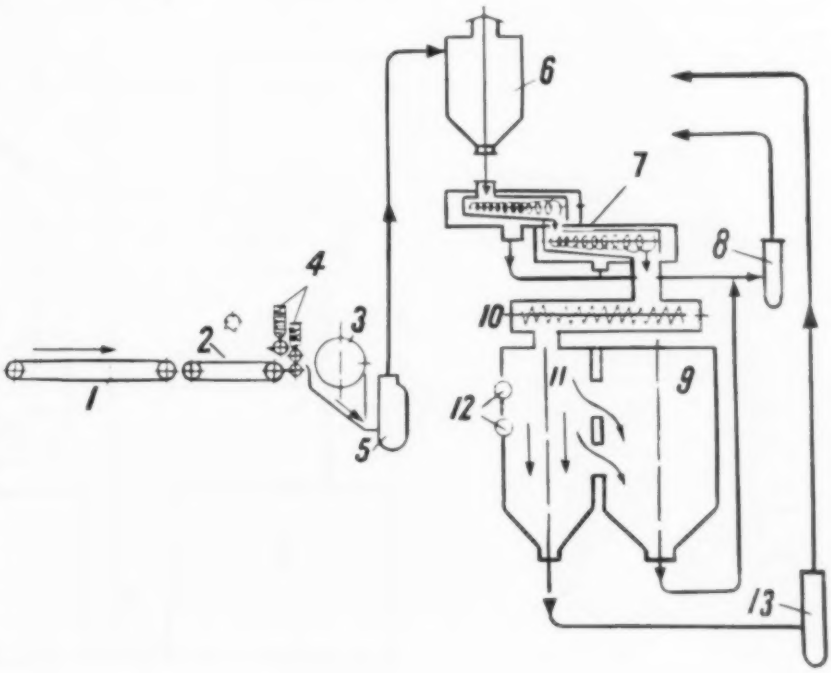
Cane cellulose is treated mainly by the sulfite process. The acid is made on a magnesium base, since calcium is less suitable. The magnesite is fed in the form of a powder. It is mixed with water in vertical mixers of about 2,120 gallons capacity; the suspension is fed by pump. The acid sections operate on pyrites. They are equipped in two parallel lines with the usual appliances for absorption of $SO_2$, mostly Hagglund units. The $SO_2$ absorption is based on counterflow. In the preparation of 212 gallons of raw acid, 77 to 88 lbs. of pyrites, 10,000 to 10,500 gal. of water and 25 to 28 kwt.-hrs. of electric power are consumed.

The feature of cane cellulose boiling is that it can be done with low strength digesting acid, which is pumped in simultaneously with the feeding of the chopped cane charge; both take about one hour. The acid is fed through a circulating system heated to 185 to 194 F. The content of all $SO_2$ in the acid at the moment of pumping is about three per cent; at the start of boiling it is 2.6 to 2.8%. Table I shows the quantity of bagasse and acid charge fed into varied capacity boilers.

"The lowered content of digesting acid and the acid's limited content of free $SO_2$ evidently creates milder conditions for boil-

*Fig. 1. Diagram of Preparatory Department*

*1 belt conveyor*
*2 conveyor feeder*
*3 cane cutter*
*4 spring rollers*
*5 blower*
*6 cyclone*
*7 two-stage dust extractor*
*8 blower*
*9 dust collector*
*10 screw conveyor*
*11 vertical dust extractor*
*12 fans*
*13 blower*



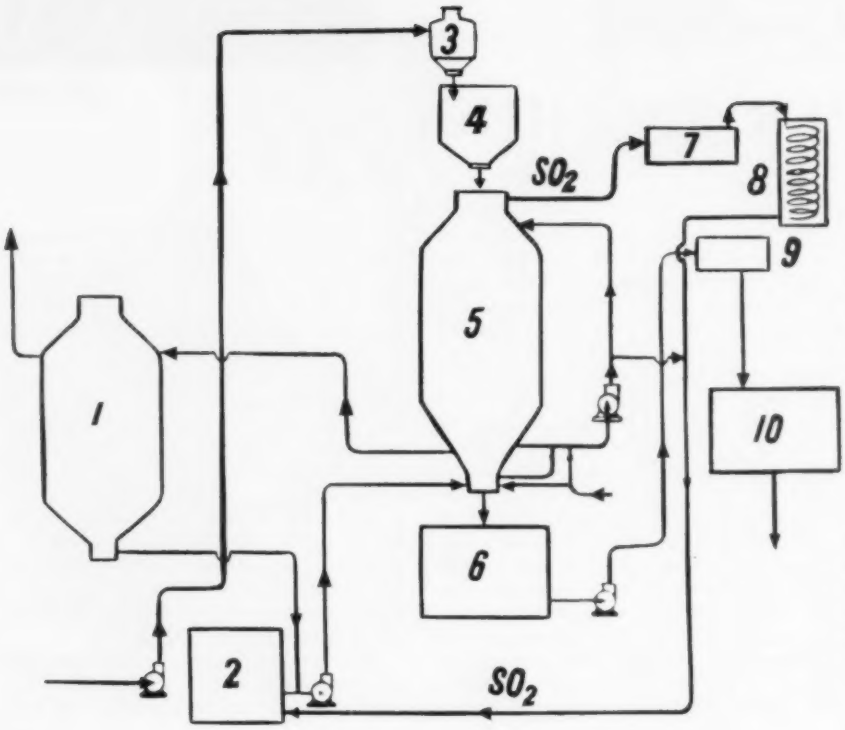



*Fig. 2. Diagram of Boiling Department*

| | |
|---|---|
| *1 tank* | *6 blow pit* |
| *2 tank of digesting acid* | *7 heat-exchanger* |
| *3 cyclone* | *8 refrigerator* |
| *4 hopper* | *9 separator* |
| *5 digesting boiler* | *10 tank of unscreened cellulose* |

| | |
|---|---|
| Charging the cane | 0-52 |
| Brewing (temperature rises to 160 C (320 F)) | 1-30 |
| Boiling | 2-25 |
| Lowering of pressure | 0-35 |
| Blowing out | 0-28 |
| Total turnover time of the boiler | 5-56 |

Initial temperature 92 C (197.6 F)

Final temperature 156 C (312.8 F)

Boiling temperatures are held to schedule. Temperature and pressure are raised continuously without stopping for steeping. Final temperature is kept within the limits of 320 to 327.2° F. Pressure in the boiler during boiling does not exceed 8.5 lbs. per square inch; it is under usual controls. According to Chinese figures, the boiling of one ton of cane cellulose requires 4250 to 4280 lbs. bagasse (absolutely dry), 1660 to 1710 gallons of digesting acid, 3160 to 3420 gallons of water (including that used during blowing out); 18 to 20 kwt.-hrs. of electric power and 0.4 to 0.5 ton of steam, excluding that spent on heating up the boiler content before the start of boiling.

ing bagasse which in turn heightens the yield of fibre owing to the retention in it of a large quantity of pentosans," the Russian engineer Foteyev commented. "Careful cleaning of bagasse, simultaneous charging of bagasse and acid, and also maintenance of a constant ratio of linked and free $SO_2$ in the boiling process positively contribute to increased output and improved quality of cellulose. The equipment of boilers with circulating units also contributes to boosting the output of cellulose from cane."

The accompanying Figure 2 is a diagram of the boiling shop which is said to operate satisfactorily although its circulation units are without preheater.

Although the boiling system is almost identical everywhere, the boiler turnover varies at different mills. The boiling lasts variously from 1 hour 40 minutes to 2 hours 45 minutes. The time spent on separate operations at one of China's leading mills is given as follows (in hours and minutes):

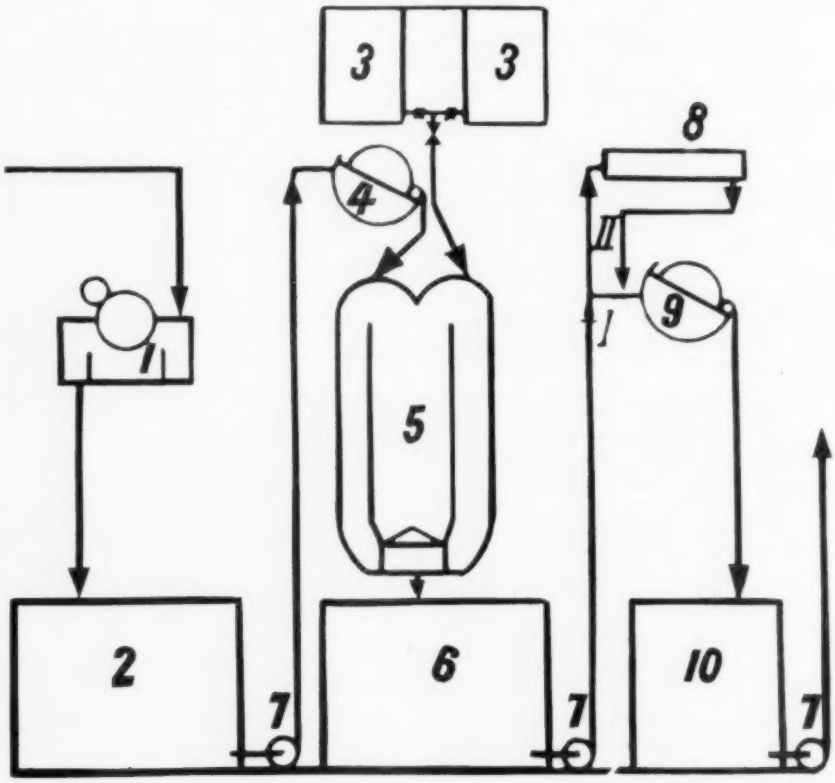



*Fig. 3. One-Stage Bleaching System*

| | |
|---|---|
| *1 condenser* | *6 tank of bleached unwashed cellulose* |
| *2 tank of unbleached cellulose* | *7 centrifugal pumps* |
| *3 measuring tanks of chloride solution* | *8 flat screens* |
| *4 filters of unbleached cellulose* | *9 filters of bleached cellulose* |
| *5 bleaching hollanders* | *10 tank of bleached and washed cellulose* |

TABLE I.

*Indices*

| | | | |
|---|---|---|---|
| Boiler capacity in gallons | 40,000 | 41,400 | 55,000 |
| Bagasse in Tons | 28 to 30 | 29 to 32 | 39 to 42 |
| Volume of acid pumped in gallons | 23,200-23,800 | 25,600-26,400 | 35,600-37,000 |
| Content of all $SO_2$ in per cent | 3.0 to 3.05 | 3.1 to 3.2 | 2.6 to 2.8 |
| Content of linked $SO_2$ in per cent | 2.0 | 2.3 | 1.9 to 2.0 |
| Total yield of cellulose from boiler in tons | 14.5 to 15.5 | 15.0 to 16.0 | 18.0 to 20.0 |

Cane cellulose is blown under pressure of 2.75 lbs. per sq. inch in the boiler, with 790 to 1055 gallons of water heated to 131 to 140 F; it is cleaned in the same way as is sulfite wood pulp.

According to Chinese mill statistics, the output of one ton of unbleached cellulose with 10% moisture content (with cellulose output 51%) requires—

4,830 to 5,050 lbs. bagasse
550 to 590 lbs. of pyrites (42%)
205 to 215 lbs. of magnesium oxide (90%)
42,000 to 47,500 gallons of fresh water
180 to 190 kwt.-hrs. of electric power and 1.2 to 1.4 tons of steam.

Research work is currently being carried out in China to develop wider uses for the sulfite alkalis resulting from boiling cane cellulose. The alkalis contain non-organic substances in large quantity; which is said to depend on the high ash content and the negligible sugars in the bagasse.

Unbleached cane cellulose has a gray color and very high degree of dirtiness; it is therefore of limited use generally and quite useless for making print or writing paper. Chloride, calcium hypochlorite and bleaching powder are used to bleach this cellulose. At present because of its greater availability, bleaching powder is most widely used.

The bleaching not only enhances the whiteness, but also reduces fibre dirtiness and raises the chemical purity of the fibre.

According to degree of boiling, cane cellulose is classed hard, medium, and soft. Hard cellulose is seldom produced. Usually very dirty, it is used only for those kinds of paper and paperboard to which no demands are made as to purity of sheet and its whiteness. To bleach hard cellulose is considered inexpedient.

Cane cellulose of medium hardness is most widely used. It has the following characteristics; permanganate hardness 65 to 90, lignin content 2.5 to 4.5%. Such cellulose is easily bleached and its fibres are strong enough; paper produced from it is satisfactory in quality and has quite good printing properties.

Bleaching of cane cellulose is done chiefly by a single stage process, which does not differ in principle from the method of bleaching wood pulp sulfite cellulose. Employed for bleaching are two and three-pass hollanders, for the most part of the Belmar type, having various devices for stirring the mass.

The one-stage process of bleaching is described as simple, convenient and continuous. Highly skilled workers are not required for its operation. The accompanying Figure 3 shows the system in diagrammatic form.

It has reportedly been established on the basis of the experience of Chinese mills that cane cellulose must contain 12 to 15% pentosans and more. Raising the pentosan content facilitates the manufacture of printing and writing paper with great mechanical durability.

Chinese statistics show that the bleaching of one metric ton of cane cellulose from an input of 2280 to 2300 lbs. of unbleached cellulose requires 352 to 374 lbs. of bleaching powder (33%), 0.4 to 0.6 ton of steam, about 50 kwt.-hrs. of electric power. Water consumption with one-stage washing without screening does not exceed 26,420 gallons. The fibre loss with bleaching to 75 to 80% amounts to 3.5 to 4.5%; with whiteness to 85%, the fibre loss reaches 6 to 7%.

# Method For Checking Sucrose Balance In Sugar Factories

**By Jorge A. Acosta**

THE usual procedure in sugar factories is to account for the sucrose weighed at the juice scales in the form of mixed juice by adding the sucrose in the sugar produced, the sucrose in the final molasses made and the calculated sucrose losses in the filter cake by mud analysis and estimated weight. The difference between the total sucrose weighed as mixed cane juice and the sucrose accounted for in the three resultant cases mentioned above are the undetermined losses.

The losses in the bagasse are accounted for separately by a direct sucrose analysis of the bagasse and the determination of the percentage of bagasse produced by the cane as follows:

The weight of the cane, plus the weight of the maceration water, minus the weight of the mixed juice introduced to the boiling house should give us the amount of bagasse. In places where the cane is washed, an extra predetermined amount is added to the weight of the cane representing the wash water that enters the mill adhered to the cane.

One defect in using the methods described above is that the sucrose in the cane being ground does not enter into the picture even though while grinding cane a sample of the crusher juice is taken constantly and is considered as representative of the quality of the cane being ground. Let us see what happens when the sucrose in the crusher juice is used to check the sucrose balance as indicated in the Run Reports.

It would be very interesting for some sugar factories to go back a few crops and check their final crop report as follows:

First, it must be agreed that it is impossible to feed the mill exactly 2,000 lbs. of cane out of every ton weighed due to evaporation, spillage, cane knives or shredder action, dirt and waste in general. How much is to be deducted depends on each individual mill but a figure of four to 12% would be acceptable, so it may be assumed for this illustration that a discount of eight per cent means that only 92% of all the cane weighed will enter the mill. If the laboratory report shows that the cane has 16% average fibre it means that 1-.16=84% of the total weight of the cane would be juice. Now, if the juice samples show an average sucrose of .15 this means that a crop of 200,000 tons of cane should have yielded (200,000 x 2,000 x .92 x .84 x .15) lbs. of sucrose if 100% of the juice could have been extracted. This being impossible there is only one outlet for the losses which is of course, the bagasse. Now, suppose the laboratory

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*Sucrose balance in the sugar factory is an important measure of efficiency of operations and must be determined by weighing and analysis of sucrose introduced to the factory and coming out as commercial sugar and losses. A modified formula is here suggested for this calculation.*

report shows the bagasse as being 35% of the cane with an average sucrose of three per cent. This means then that by using the laboratory figures throughout, the difference between (200,000 x 2,000 x .92 x .84 x .15) and (200,000 x 2,000 x .92 x .35 x .3) would be the total amount of sucrose pumped from the mill into the boiling house and should be equal within reason to the combined sucrose balance of total pounds of sucrose in all the sugar produced, plus the total pounds of sucrose in all the molasses made plus the total pounds of sucrose lost in the filter cake plus the total pounds of sucrose of undetermined losses; all of these as reported in the final crop reports. In checking the sucrose balance as outlined above, cane varieties should not make any difference; however, having changed from hand harvested to mechanically harvested cane, a higher allowance should be made for dirt and trash in the cane and therefore, a lower percentage.

If with the sucrose balance reported in the Run Reports it is not possible to account for all the sucrose entering the mill as shown in this proving method, it could mean that bagasse losses are actually higher than reported.

If bagasse losses look reasonable, it is probable that the report gives too low a figure for undetermined losses. This can also happen when juice weighing is off and more sucrose is introduced to the boiling house than the weighing report shows. In which case the percentage bagasse figure will be too high.

If more sucrose is accounted for than that calculated as entering the mill, it will be necessary to use a higher factor than 92% of the cane weighed as entering the mill.

With this method of checking the sucrose balance many interesting things can be uncovered and with logical reasoning, waste and losses can be spotted and stopped.

Engineers who have had some experience in the operation of a sugar factory know that there are normal and inevitable sucrose losses whether from inversion or drop in purity or because of physical or mechanical reasons such as cleaning and washing the equipment, leaky packings of pumps and valve stems, breakdown and repairs of the equipment, spillage, flying dust, entrainment and even a certain amount used by the working personnel. It is therefore, absurd not to accept a reasonable amount of undetermined losses.

Some sugar factories by using analytical methods which are not very accurate, show unbelievably low bagasse losses. Others by improper juice weighing methods and allowing more sucrose into the boiling house than actually recorded show undetermined losses way under what they really are (sometimes even a plus figure) penalizing the mill extraction factor and producing inaccurate Run Reports which fail to show abnormal sucrose losses that may occur in the processing operations.

For better control it is suggested that the clarified juice be metered as well as sampled and the difference in the amount of sucrose between the raw juice weighed and the clarified juice metered be accepted as filter cake or mud losses on the raw house provided the raw house takes no returns from a refinery into the juice proper.

By observing the mud losses as figured in this manner and keeping a close check on the operation of the filter with the analytical sucrose determination of the filter cake, more accurate figures can be obtained.

This same method of mud loss determination could work in a refinery where the intake of raw sugar is weighed and sampled. Then the filtered liquor ready for the vacuum pans could also be metered and sampled. The sucrose difference between the total raw sugar weighed and the total sucrose in the filtrate could be called the refinery mud losses. Of course, all the sweet water recovered from sweetening off the filter cake, scums, etc. will have to be used for melting the raw sugar keeping it in the refinery proper.

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## Letter to the Editor

*To the Editor,*

With reference to the announcement in the English section of your esteemed magazine in June 1957 on page 32, "Three Mills of Fives-Lille", we beg to inform you as follows.

Stork-Werkspoor Holland manufactured and delivered directly to the client the following equipment for the sugar factory in the Niari Valley mentioned in that announcement:

cane unloading equipment, milling station, boilers with auxiliary equipment, pumps throughout the factory, condensors, spray pond with pumps, syrup and molasses-tanks, sugar melting equipment, electric motors, and buildings for cane unloading and stocking, mill station, boilerhouse and milk of lime plant.

We would be very much obliged if you would be willing to include in your next issue some text with relation to the above mentioned facts.

*Koninklijke Machinefabriek*
*Gebr. Stork & Co. N.V.*

■

## Vivian Joseph Gianelloni

Vivian Joseph Gianelloni, president of the Punta Alegre Sugar Corporation, died in Havana, Cuba at the age of 65, on November 13. Mr. Gianelloni graduated from Louisiana State University with a degree in mechanical engineering and joined Punta Alegre in 1917. In 1938 he was made vice-president and in 1951 was elected president.

*Sugar's Progress in*

# HUMAN RELATIONS

Roy J. Leffingwell

## SHORT-CUT TO PROFITS

A New York scientist recently said, "Most human beings are ambling along at probably no more than 5 to 6 per cent of their possible efficiency."

In terms of productivity this means that you are losing 94 to 95 per cent of the potential output of your employees. Should your factory have an efficiency loss of anything like that you would probably take drastic action. Then, isn't it time we in the sugar industry take a closer look at the profits we are overlooking due to human productivity losses?

It is possible to make big increases in the amount of work employees turn out, and at small cost. Massachusetts Institute of Technology recently reported that 12 companies, which had been using a cooperative management plan for only two years, increased their productivity up to 60 per cent. So, there is little doubt that something can be done to increase the productivity of employees.

If you want to take a short-cut to such profits, the first step is to find out what your productivity per ton of sugar is at this time. SUGAR Y AZUCAR published last month our International Sugar Industry Productivity Formula. This provides you with a standardized method of determining your productivity—and permits you to compare this with others. To provide a worldwide exchange of this information SUGAR Y AZUCAR will publish the productivity figures sent us each month. No company names will be used, so please send us your productivity calculations today. It will help you, and the entire industry.

Once you know where you stand on productivity, steps can be takes to improve this output through the application of human relations knowledge. Month by month you will be provided with suggestions and ideas in our "Sugar's Progress in Human Relations" section.

Obviously, the sugar industry must turn increasingly to the use of machines. Good human relations will not provide the worker with power to pick up a 500 pound bundle of cane. But, productivity is even more important where employees use machines, than hand tools. If a man gets only 5 to 6 per cent efficiency out of a hand hoe this may not be too serious. But, if he only gets this efficiency out of a $100,000 piece of machinery it is a heavy loss.

If our employees are ambling along at only 5 to 6 per cent of possible efficiency—and most of you will agree that this is not an unreasonable statement—you have available additional profits through improved human relations. With relatively low returns on most sugar investments, this short-cut to profits cannot be overlooked by any progressive management.

Last month we provided our readers with an International Sugar Productivity Formula. For the first time in history it is now possible for individual growers, mills and factories to determine, on a standardized basis, the productivity rate of their employees. And, as we mentioned, each month we will publish productivity figures which you provide us, so they can be compared on a world-wide basis. (Personal or company names will not be divulged.)

Some may ask, "Why all the interest in productivity—we have been in operation a long time and never bothered about it before?" The answer is that we know more about the subject now than ever before. And, it comes at a time when production is getting ahead of consumption in sugar, and prices are becoming more competitive. Only those who can keep production costs down will survive, economically.

From a practical point of view there are only two ways to cut cost: (1) increase the efficiency of employees, (2) use more and better machines. Reducing wages and the cost of things we buy are hardly practical solutions.

So far, the emphasis has been on the use of more and better machines. But, human beings must operate these machines. And, inefficiency of employees is only magnified with these tools.

There is a move now to insist upon a closer link between wages and efficiency. In the U.S. productivity moved up automatically year by year at about 3%, because we were using more and better machines. But, for the past two years this increase in productivity has not kept pace.

Clifford F. Hood, President of United States Steel Corporation recently said, "Our real desire is to raise our rate of productivity increase, with the cooperation of our employees and their collective bargaining representatives, to the highest attainable level; reduce our cost and, as we progress, to negotiate wage increases which respect the related interests of the employees, owners, and customers of U.S. Steel."

The day is near when wages must be tied to what the employer gets in return for his money. Through scientific research we now know that many employees work at 5 to 6 per cent of their potential efficiency.

Science has also found that increasing employee productivity is a job for the employer. It is not unusual for companies to increase the productivity of workers by 60 per cent or more.

For the next few months this page will discuss some of the ways and means used to increase productivity.

In the meantime, figure out the productivity of your employees, using the International Sugar Productivity Formula—and send us the figure. We won't identify you, or your company.

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Labor cost for hired employees in the Australian sugar industry in 1954 amounted to about 34% of the grower's total cost, according to a recent survey made by the Quarterly Review of Agricultural Economics.

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In negotiations, now underway between 26 Hawaiian sugar plantations and the International Longshoremen's and Warehousemen's Union (ILWU), the union clamped a news blackout on anything dealing with the subject last October. They discontinued daily English, Filipino and Japanese radio broadcasts and have refused to discuss negotiations with the press. Jack Hall, the ILWU regional director said, "we are trying to de-emphasize publicity to some extent." Hall further said the union had not asked employers to go along on the blackout of news. In the meantime, the companies, through the Hawaiian Sugar Planters' Assn., are continuing several daily radio programs, twice-weekly TV showings, and other communication efforts.

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A compulsory arbitration law has been proposed for the United States by Senator Kuchel, California's junior member of the upper chamber. The Senator commented that revelations of union racketeering have "sickened the American people" and Congress should consider "compulsory arbitration laws". The California lawmaker said he expected to urge legislation at the next session of Congress requiring "a secret ballot" for all union elections.

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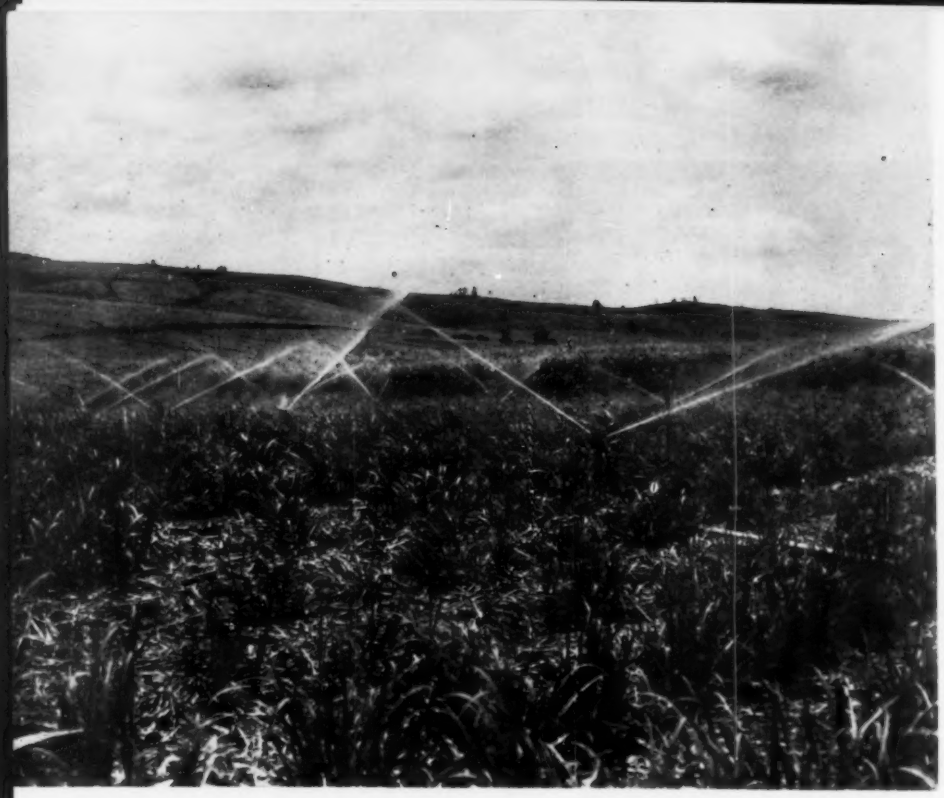
In Hawaii, the sugar industry is rapidly getting away from company houses. And, the sugar companies are almost entirely out of the store and theatre operation. Housing has been a money-losing matter for years, as have stores. The plantation companies are turning the stores to independent operators and making land available, wherever possible, to encourage home ownership by employees.



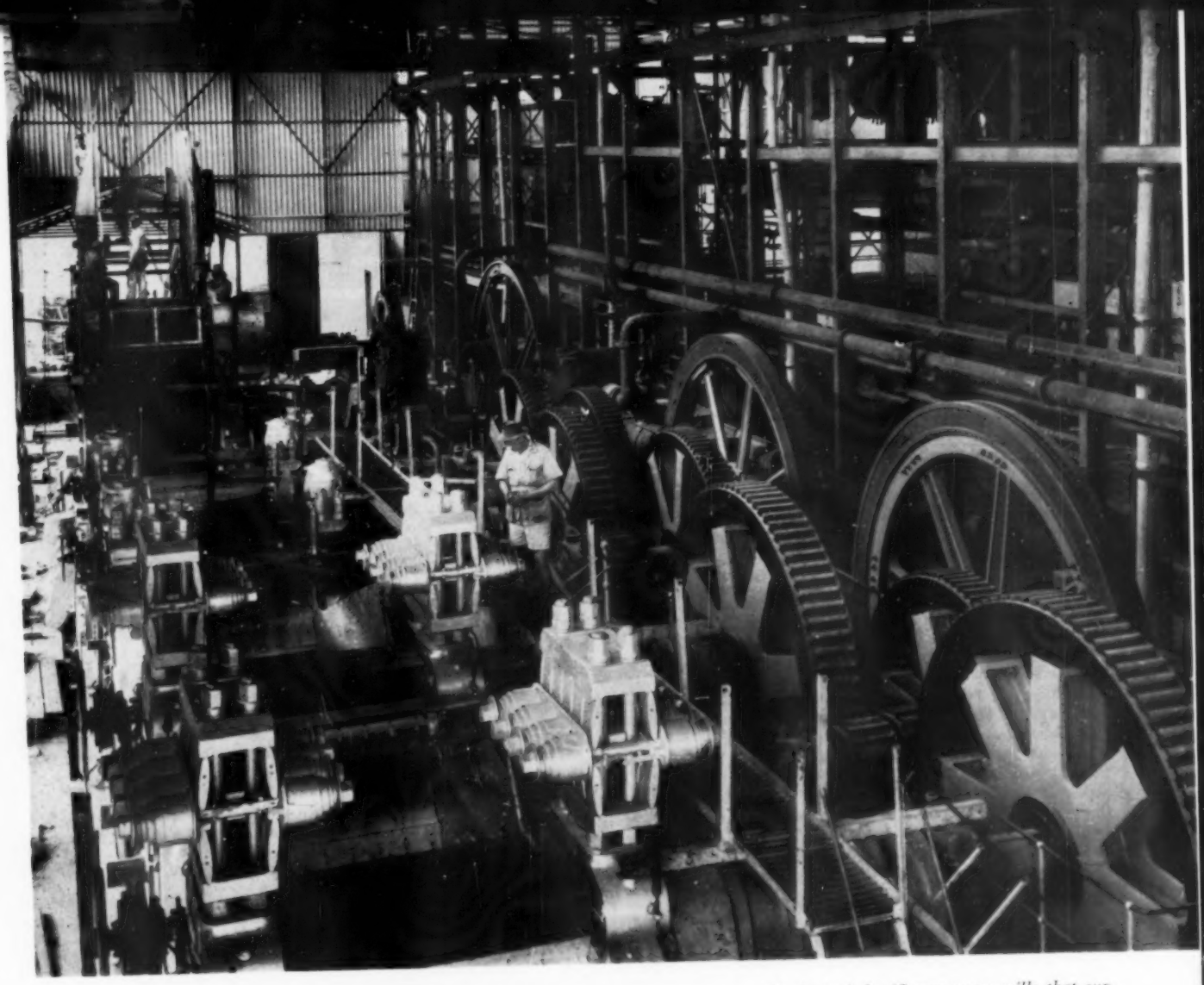
In December 1851 the first sugar ever made in South Africa came from the estate of Edmund Morewood at Compensation, 36 miles north of Durban. Today the industry covers a subtropical strip 250 miles in length along the eastern seaboard of South Africa. From this belt annual production is approximately 900,000 tons of raw sugar derived from 8,000,000 tons of cane grown on 500,000 acres, of which about half is harvested annually. Despite the subtropical climate the Experiment Station breeds its own varieties in glass houses. The Sugar Milling Research Institute, run jointly by the Natal Sugar Millers' Association and the Council for Scientific and Industrial Research, has contributed much to the efficiency of the growing South African Industry and to the world's knowledge of sugar technology. Seventeen mills in the sugar belt plus one at the Pongola Irrigation Settlement make raw sugar. Two make refined, nine produce plantation whites. Production from the other seven is further processed at the Central Refinery.

# SOUTH AFRICAN SUGAR

## . . . *in Pictures*

(Photos Courtesy Authenticated News)

*Key to the development of the South African sugar industry is the hilly nature of most of the ground. This has governed development of mechanization and irrigation. Above is illustrated portable overhead irrigation system. Imported cane is subject to quarantine as shown at left. Many varieties are now being developed in South Africa through the work of the Industry's Experiment Station financed and maintained entirely by the sugar industry. Modern methods of cultivation are used despite the topography. Cane trash is left in the field where, besides conserving moisture, it helps prevent erosion. An aerial survey of the whole sugar belt has recently been completed.*



*Typical of the 17 raw sugar mills that supply all domestic requirements as well as surplus for export, is the tandem shown above. An even feed to the mill may be seen below. Trucks are replacing railroads in many areas. The 25-ton unit pictured at left is based on those used in Hawaii.*

# facts about sugar

DECEMBER 6, 1957: World spot raw sugar prices advanced from the year's low of 3.50¢ on November 8th to 4.03¢ per pound early in December, following reports that substantial quantities of cane had been burned by Castro forces in Cuba. While it is impossible to estimate the potential damage that continued incendiarism might cause, B. W. Dyer & Company, Sugar Economists & Brokers, believe that there is enough cane to provide a considerable margin of safety.

The International Sugar Council on November 19th reimposed sugar export quotas for 1957, because the spot price had averaged below 3.90¢ per pound for 17 consecutive market days. The 1957 quotas became inoperative last January 25th, when the price had averaged above the upper limit of 4¢ specified in the Agreement.

On November 28th, the International Sugar Council estimated 1958 free market requirements at 5,515,000 metric tons, (6,079,249 short tons) raw value. [Although the initial 1958 export quota was set at 4,865,000 tons (5,362,746 short tons), it appears that there is at least 1,000,000 tons also available from countries that are not members of the Agreement. However, there is some doubt that the export quotas of Soviet sphere countries, amounting to 735,000 metric tons (810,199 short tons), will be filled.] The next meeting of the International Sugar Council will be held in March.

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F. O. Licht made slight upward revisions in 1957/58 production estimates for Europe. The new figure for Western Europe is placed at 7,383,000 metric tons (8,138,000 short tons) raw value, compared with a previous prediction of 7,362,000 tons (8,116,000 short tons), and 6,939,000 tons (7,649,000 short tons) last season. Eastern Europe is now estimated at 8,285,000 tons (9,133,000 short tons), versus 8,112,000 tons (8,942,000 short tons) previously, and 7,426,000 tons (8,186,000 short tons) last season.

The Foreign Agricultural Service of the U. S. Department of Agriculture estimates that 1957/58 crop year world sugar production will be 47,689,000 short tons, raw value, compared with 45,481,000 tons in the previous period, or a gain of about 4.9%. However, their estimate of Russian production is only 4,800,000 short tons, in contrast to Licht's prediction of 5,600,000 short tons.

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Cuban sales to the world market (outside U. S.) through November 30th were 2,630,068 English long tons (2,945,676 short tons), according to a survey by Willett & Gray, Inc., compared with 2,635,701 tons (2,951,985 short tons) to that date last year.

Cuban exports to the U. S. to November 15th totaled 2,556,846 Spanish long tons (2,904,120 short tons), compared with 2,536,480 tons (2,880,988 short tons) during that period last year. Exports to other countries amounted to 2,331,946 tons (2,648,674 short tons), versus 2,214,886 tons (2,515,715 short tons) to November 15, 1956.

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Domestic spot raw sugar prices advanced to $5.85 per 100 pounds towards the end of October, but then declined to $5.55 in November. Following that, prices advanced, and reached $5.75 on December 5th, as quota supplies in the Northeast became virtually exhausted. Refined sugar prices were generally unchanged during this period.

The 1957 U. S. sugar quota was cut by 75,000 tons to 8,975,000 short tons, raw value, on December 3rd, and a Philippine deficit of 50,000 tons and an Hawaiian deficit of 40,000 tons were reallocated. These changes may increase the supplies available to Northeastern refiners by about 20,000 tons, consisting of a Cuban increase of about 25,000 tons, and a decrease of about 4,000 tons for "full duty" countries. It was indicated that most of the Cuban increase previously had been sold to refiners. It was also announced that refiners could receive a limited quantity (totaling possibly 10,000 tons) of over-quota raw sugar for refining in bond.

In making the quota changes, the Department of Agriculture stated:—". . . Although the total sugar supply for 1957 would be excessive if all quotas (previously) totaling 9,050,000 tons were fully effective, a moderate shortage of sugar for refining has been developing in the Northeast. . . . This has occurred despite the prospect for a large increase in year-end refiners' inventories of quota sugar in the south and west and in constructive deliveries of beet sugar. . . ."

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Hearings on U. S. sugar requirements for 1958 were held on November 19th, and the highlights were:—a) The U. S. Cuban Sugar Council estimates that year-end 1957 U. S. stocks will be considerably larger than usual, resulting in lower 1958 quota consumption needs. Also, in the absence of some new international crisis, world market conditions are not likely to exert any price raising effects on the U. S. market; b) The industrial sugar users feel that the new amendments to the Sugar Act resulted in supply difficulties in 1957, and requested an initial quota of not less than 9.3 million tons; c) The Beet Sugar Association believes that burdensome world stocks are in the making. World sugar prices have fallen 50% in the last four months, while U. S. distribution was 280,000 tons behind last year. They asked for a conservative, realistic quota at an early date; d) The Sugarcane League of U. S. A. requested a similar quota, with a specific price objective (the cost-of-living "yardstick"); e) The Association of Sugar Producers of Puerto Rico mentioned the cost-price squeeze, and requested a quota that would bring the price of sugar up to the "yardstick"; f) The Hawaiian Sugar Planters' Association pointed out that current quotas were considerably in excess of 1957 deliveries, and wanted the 1958 quota adjusted to bring supplies and requirements in balance.

Refined sugar distribution at the end of November totaled 7,927,000 short tons, raw value, or 316,000 tons behind those of the corresponding period last year. Thus, it appears that total 1957 deliveries will be about 8,600,000 tons, B. W. Dyer & Company concludes.

## SUGAR PRICES DECEMBER 5, 1957

| | |
|---|---|
| **Ex Duty Raw Sugar New York** | **5.75** |
| **Average No. 6 Raw Sugar January 2-December 5** | **5.75** |
| **Refined Sugar Gross, New York** | **9.15** |
| **No. 4 Raw Sugar (f.o.b.) Cuba** | **4.03** |
| **Average No. 4 Sugar January 2-December 5** | **5.26** |

| ***Futures Prices*** | ***Contract #6*** | ***Contract #4*** |
|---|---|---|
| **March, 1958** | **5.66** | **3.99** |
| **May, 1958** | **5.70** | **3.98** |
| **July, 1958** | **5.77** | **3.99** |
| **September, 1958** | **5.83** | **3.99** |
| **October, 1958** | **—** | **3.96** |
| **November, 1958** | **5.81** | **—** |

### Reduced Carryover In India

Sugar production in India in the 1956-57 season has recorded a rise looking at the figures to mid-August, and despite exports domestic supplies will be adequate. The season is expected to have a carry-over of 360,000 tons, against the carry-over of 542,000 tons in the previous season.

With the season practically over now, a survey of the general position reveals that the total production during the season to October will be 2,025,000 tons. The carry-over from the previous season was 542,000

tons and this brings the total available to 2,567,000 tons. Off-take to mid-August is put at 1,686,000 tons, including exports. Assuming an average monthly consumption of 170,000 tons during the remaining 2½ months of the season viz: August to October, the aggregate off-take (including the quantity to be shipped) will come to 520,000 tons, bringing the total off-take during the season to 2,206,000 tons and leaving a carry-over of 361,000 tons.

The Reserve Bank's directive in July this year to curb advances on sugar which amounted to Rs 600 million ($126.3 million) in June has not had much effect in bringing down the prices, although destocking has been accelerated by the move to step-up margins against sugar advances.

The Government raised the excise duty on sugar from Rs 5.62 ($1.18) per cwt to Rs 11.25 ($2.36) in the last budget, and the domestic prices have risen to that extent.

According to official sources, the Indian Government made a profit of Rs 58.4 million ($12.3 million) in importing and selling sugar during the period 1953-54 to 1955-56. A total quantity of 1,327,000 tons were imported at a cost of Rs 687.3 millions ($144 million) on which an import duty of Rs 283.3 millions ($59.5 million) was paid. Sales realized Rs 1070 millions ($224.5 million) leaving a profit of Rs 58.4 millions (12.3 million) for the Government.

### HSPA's 77th Annual Meeting

Returns from the 1957 Hawaiian crop of some 1,087,000 tons of 96 degree raw sugar are estimated at $120.37 per ton—up from $118.40 in 1956.

Molasses is expected to return about $17.50 per ton for 1957 output—down from $27 per ton in 1956.

In addition, conditional compliance payments under Sugar Act legislation will probably total about $10 million to the 27 plantation companies and some 1,290 growers in the Islands.

These are highlights of the report made by A. G. Budge, President of the Hawaiian Sugar Planters', to the 77th annual meeting of that group in Honolulu, December 2.

Hawaii's production fell below the two previous years in 1957. In 1956 it was 1,099,543 tons and in 1955 it was 1,140,112 tons. Reasons for the drop were colder weather during the two year growing cycle of this crop and dry weather conditions early in 1957 which permitted unusually rapid harvesting, resulting in younger cane being taken off. However, Mr. Budge pointed out that this was the sixth consecutive year in which more than a million ton crop had been produced in Hawaii.

The effect of intense beet competition in the 11 Western States with Hawaiian sugar was mentioned by several speakers. Hawaii's sugar is refined and marketed through the California & Hawaiian Sugar Refining Corp., which is a co-op owned by the Island plantations. The returns, estimated by Mr. Budge, were those expected by the marketing organization.

It was pointed out that cane sugar now has 39 per cent of the choice market area in the 11 Western states. This is 4 per cent lower than the pre-World War II era, at which time Western Sugar Refinery was still operating in San Francisco. Meanwhile, beet sugar has increased its percentage from 48 per cent to the present 59 per cent. Foreign sugar imports provide a small proportion of the market.

Mr. Budge's report digested highlights of what he termed "the 10 eventful years". During that time the Hawaiian industry put out $114 million on capital expenditures and C&H spent $17 million.

Mr. Budge told the HSPA annual meeting, attended by some 150 top sugar executives in the Islands, that "while the price of sugar has remained relatively constant in the last 10 years, our basic wage rates have increased 59 per cent, our transportation costs 68 per cent and the wholesale commodity index reflecting the cost of things we buy, 22 per cent."

He concluded with the statement ". . . increased yields attributable to our scientific research and mechanization which has permitted us to hold our total labor cost relatively stable—have enabled us to remain marginally profitable".

Donald Maclean, President of California and Hawaiian Sugar Refining Corp., also addressed the HSPA annual meeting.

Mr. Maclean announced that C&H will establish a new pricing practice shortly, by making the lowest priced product the base quotation. For example, on industrial sugars the base price at the present time in the Western area is $9.00, before current concessions of 40 cents. Bulk granulated sugar is sold at minus 15 cents differential, and liquid sugar at a minus 10 cents differential. C&H will shortly make bulk sugar the base price. Thus, bulk will list at $8.85, liquid at $8.90, and 100-pound bags at $9.00, based on current prices.

This action follows a move started by C&H late in 1956 to unhinge industrial prices from consumer prices. The move was immediately followed by Imperial Sugar Co., in which C&H has a minority stock ownership. On September 3, 1957, American Sugar Refining Co. started the policy of issuing two price lists. One or more of the beet companies have indicated that they will also start this practice.

Mr. Maclean announced that C&H had called upon Ernest Dichter's Institute for Motivational Research to advise on a new package design. And, he told the annual meeting, C&H has completely abandoned billboard advertising and is concentrating on a heavy schedule of 10-second television spots.

Plantation representatives of Hawaii's sugar industry were told that the year 1958 was not an encouraging one from a marketing standpoint. No estimates of probable returns were made by Mr. Maclean.

Slator M. Miller, Vice President of HSPA's Washington's office, told the annual meeting that the year had been one of foreign influence on the market, and one of generally chaotic marketing. He urged that early consideration be given to planning for Sugar Act legislation.

Boyd MacNaughton, president of C. Brewer & Co., was elected 1958 president of the HSPA. This is his first time to occupy the office.

George T. Davies, president of T. H. Davies & Co., was named first vice president. J. Walter Cameron, vice president and general manager of Alexander & Baldwin, was elected second vice president of the sugar association. Both are relatively new heads of sugar factoring organizations and have not served as association officers previously.

A. G. Budge, president of Castle & Cooke, and G. W. Sumner, president of American Factors, are the two other members of the five-man Executive Committee.

HSPA employee-officers Slator M. Miller, vice-president, S. L. Platt, secretary, and Thomas M. Brown, treasurer, were reelected.

The sugar association annual meeting is held for three and one-half days. Of this time a day and a half were devoted to the Experiment Station report, introduced by Dr. L. D. Baver, station director.

### Louisiana Results Disappointing

New Orleans, La., December 3, 1957:—Everyone in the Louisiana sugar business is keeping an eye on the weather, and so far what they have seen has not been very pleasing. The adverse conditions that began about the middle of October have continued to prevail throughout November and the grinding results have been very poor up to this writing. Writing in the November 15th issue of The Sugar Bulletin, official publication of the American Sugar Cane League, Lloyd L. Lauden, Agronomist and Field Representative, had the following to say about the crop.

"Sucrose content this harvest has been very erratic in most varieties. Sugar recovery at the mills has not been good. Theories have been advanced explaining both conditions.

"The theory most frequently mentioned explaining low or erratic sucrose is that the cane is very green and still growing. Most areas suffered to some extent from lack of rainfall following Hurricane Audrey. In some of these areas little or no rainfall was received until September. Early September rains were certainly beneficial. The crop needed water. The change in color of the fields at that time was very encouraging . . . The crop estimate went up. The crop looked much better, and the rains continued. Samples taken for sucrose content during the last days of September and the first days of Oc-

(*Continued on page* 41)

*Turkey's Expanding Industry*

# Cane & Beet Factory for Cukurova

**By Tarik M. Ozil**

TURKEY is becoming a strong contender in the sugar-producing world. Commencing production in 1926 with two small units, by 1933-34 the country had four plants with a total production of 58,600 metric tons for the season. The gap between production and a higher, fluctuating consumption had been bridged by imports until the adpotion of economic autarchy. Then, by means of price adjustments, consumption was limited to the amount of sugar produced nationally which, in 1941, was sold at a fixed price of 81 cents per pound from the factory.

In 1952 the autarchy was revised in an effort to enable the home production to equal demand. In 1956, although 15 factories with a total design capacity of 25,000 metric tons of beet per day were active, the production was only 276,000 metric tons of refined sugar. Of the planted area of 306,000 acres, 72 per cent was workable.

The explanation lies in Turkey's underdevelopment and the need, therefore, to rely on the favor of Demeter for an abundant crop in the absence of modern technology. Despite handicaps, in 1956 production—with a sugar price of 32 cents per pound—outstripped consumption, and 12,000 metric tons of sugar were available for export. The following year, the planted area was extended to 370,000 acres and it is believed that a considerably higher surplus will be available for export next season. Thus Turkey is enabled to pay hard currency debts incurred in the importing of equipment for new factories.

As a nation, Turkey is, however, a poor consumer of sugar. The per capita consumption in 1956 was 22.1 lbs. (One unit of sugar is equivalent in price to 2½ units of bread, the nation's staple). But increasingly better nutrition among the population has been reflected in a rise in consumption. The figure for 1949 (120,000 tons) had more than doubled by 1956 (245,000 tons).

Research carried on until 1952 showed that a 2.6-ton yield of sugar per acre could safely be expected from the cane grown in the alluvial plain of Cukurova (lowland) that stretches from the foot of the Taurus Mountains down to the Mediterranean. In 1949, after ten years' study, sugar company officials together with government members were bargaining with cotton field owners for purchase of these lands to unite them in a cane plantation which, it was planned, would produce all of the cane cultivated by the agronomists of the sugar company. The cotton farmers, however, were not disposed to sell their land cheaply and so the matter was dropped. Recently, though, the project was revived by the Prime Minister who plans to secure collaboration of the growers by letting them have a share in the company stock through farmers' cooperative societies. These, together with individual growers, would supply the mill with cane.

The mill itself would have the peculiarity of being a combined beet-and-cane plant consisting of a single sugar house containing diffusion equipment and mills in order to process the beet early in summer, and the cane afterwards in the autumn. There would be a cellulose plant to make some 10,000 tons of pulp from bagasse.

On the other hand, as no beet has so far been cultivated in Cukurova even for experimental purposes and conditions are not promising, it is doubtful that beet cultivation will be as lucrative a business for the growers as cane planting, unless the lowland beet were to be higher priced than beet from elsewhere.

The beet price is determined by the Government, irrespective of sugar content. The highest income for beet growers has been about $280 per acre with an 8-metric ton yield in the northeastern district where 95 per cent of all fields are irrigated. The cane crop has been something between 32 and 40 metric tons per acre in Cukurova. Today the main crop in Cukurova is cotton which does not rotate with cane. Cotton earns about $110 per acre.

*A beet sugar house in Turkey built in 1953. Delivered by rail car the beets are shown as they are being washed before processing. Turkey has both a cane and a beet industry, with considerable expansion planned for both.*

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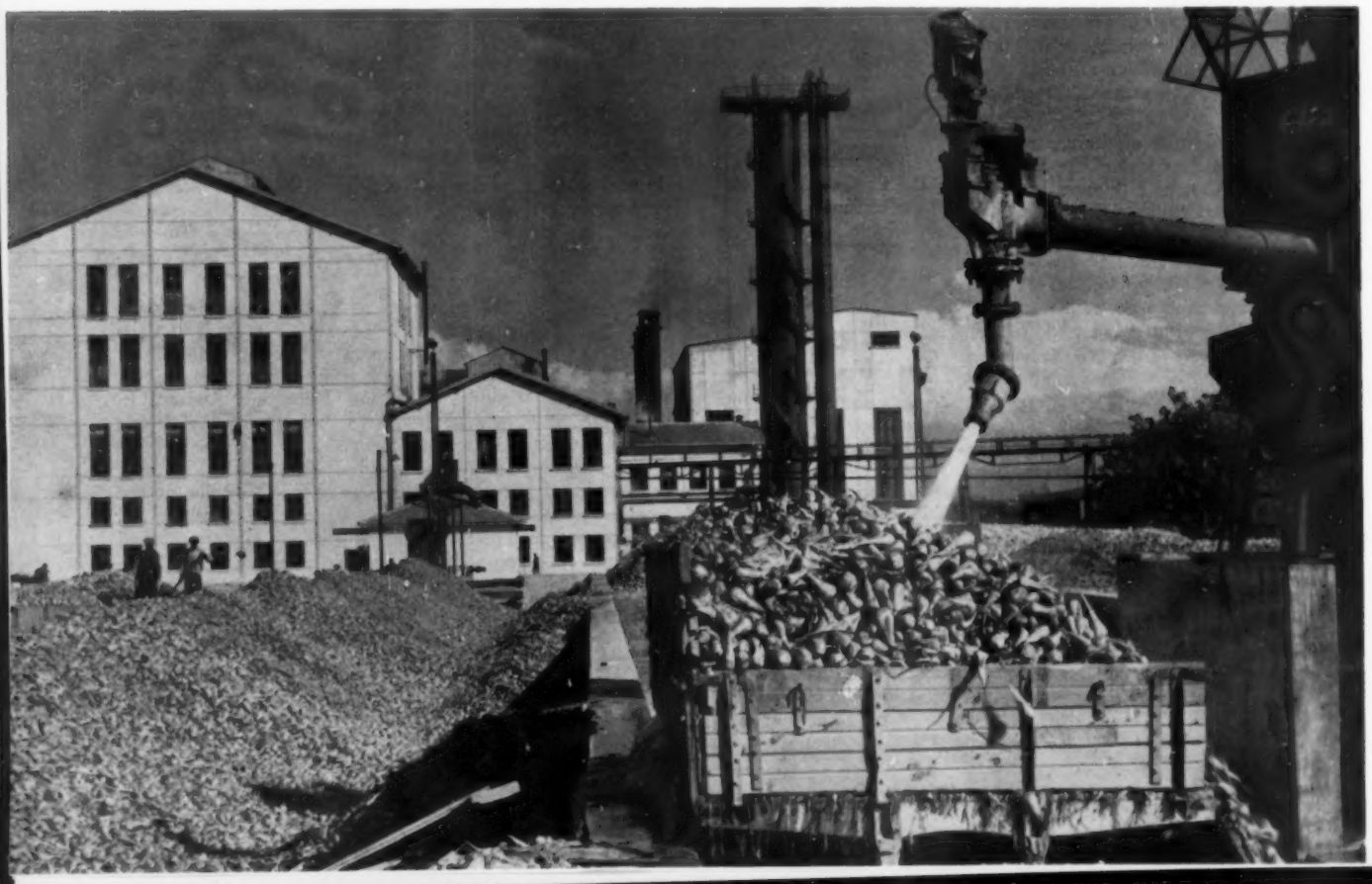


# 1910 - 1954

## Puerto Rico Increases Fertilizer Use 1000%

**By Arturo Riollano**

SPURRED on by the results of early findings on the value of fertilizer for sugarcane, the growers began using fertilizer heavily on cane in Puerto Rico as indicated by records going back to 1910.

At times it was difficult to say whether the research on fertilizer usage justified the quantity of fertilizer used, but this heavy fertilization always inspires the research worker to find out how best to use cane fertilizer for optimum yields of both cane and sugar.

Sugarcane production in terms of tons of available 96 sugar increased almost four times by 1954 as compared with 1910 (Table I), whereas sugarcane acreage increased only about twice. Inasmuch as the land suited for sugarcane is limited because of the size and topography of the Island, increases in acreage devoted to cane are limited also. Due credit for this great increase in yields of sugar per acre over this period should be given to the use of new and better cane varieties and fertilizers. Fertilizer consumption rose over tenfold from 23,734 tons in 1910 to 247,995 in 1952. Except for the curtailment of fertilizer imports in the 1942-44 World War II period, the use of fertilizers has increased steadily. The curtailment of fertilizer use was reflected in the 1943-46 yields which were below the one-million-ton sugar level.

In the beginning of the twentieth century most of the fertilizer analyses used for cane were those popular in the United States for other crops. No attempt was made to adapt fertilizer analyses to the particular needs of Puerto Rico soils and crops. The fertilizer analyses then used were such as 3-9-3, 9-6-3, or 10-6-0. The rates used per acre were low. From the experiments carried out by the Agricultural Experiment Station, the growers recognized the value of the data obtained and began to use Station recommendations. The use of higher nitrogen and lower phosphorus fertilizer formulas for sugarcane increased, and the pounds of fertilizer applied per acre also rose.

Today, in Puerto Rico, the pattern of fertilizer usage is, on the average, 1,200 pounds of a 12-4-10 or 14-6-8 (36). The nitrogen carrier is generally ammonium sulfate (20-percent N), although ammoniated phosphates, urea, and other high-nitrogen synthetics are used in part with the ammonium sulfate in making high-

*This motorized unit applying fertilizer in Hawaii is similar to the mechanical equipment now widely used in Puerto Rico to apply an estimated 190,000 tons of fertilizer annually to the sugar crop.*

**Table I. Fertilizer Imports and Sugar Production in Puerto Rico, 1910-54.**

| *Season* | *Fertilizer* imported (tons)* | *96 sugar produced (tons)* | *Area in cane (acres)* | *Season* | *Fertilizer imported (tons)* | *96 sugar produced (tons)* | *Area in cane (acres)* |
|---|---|---|---|---|---|---|---|
| 1910-11 | 23,734 | 349,840 | 196,000 | 1931-32 | 87,888 | 992,433 | 293,953 |
| 1911-12 | | 371,076 | 196,000 | 1932-33 | 95,356 | 834,310 | 300,071 |
| 1912-13 | 18,836 | 398,004 | 196,000 | 1933-34 | 120,809 | 1,113,697 | 300,126 |
| 1913-14 | | 351,666 | 196,000 | 1934-35 | 87,800 | 780,741 | 299,384 |
| 1914-15 | 24,290 | 346,490 | 196,000 | 1935-36 | 123,867 | 926,037 | 299,804 |
| 1915-16 | | 483,389 | 223,000 | 1936-37 | 179,399 | 996,346 | 300,951 |
| 1916-17 | 45,767 | 503,081 | 223,000 | 1937-38 | 160,200 | 1,077,120 | 300,567 |
| 1917-18 | 40,811 | 453,793 | 223,000 | 1938-39 | 97,444 | 851,959 | 314,300 |
| 1918-19 | 21,815 | 406,133 | 223,000 | 1939-40 | 130,090 | 1,018,804 | 303,399 |
| 1919-20 | 50,085 | 485,887 | 240,000 | 1940-41 | 137,068 | 931,997 | 337,000 |
| 1920-21 | | 491,114 | 241,000 | 1941-42 | 107,525 | 1,147,587 | 337,900 |
| 1921-22 | 43,260 | 405,936 | 244,180 | 1942-43 | 45,593 | 1,039,237 | 319,400 |
| 1922-23 | 56,789 | 379,071 | 239,676 | 1943-44 | 150,520 | 723,360 | 312,600 |
| 1923-24 | 75,670 | 447,973 | 236,600 | 1944-45 | 168,757 | 963,747 | 335,800 |
| 1924-25 | 68,031 | 660,532 | 240,010 | 1945-46 | 169,786 | 909,000 | 351,700 |
| 1925-26 | 79,575 | 606,464 | 242,745 | 1946-47 | 220,373 | 1,088,000 | 364,800 |
| 1926-27 | 93,096 | 630,201 | 236,148 | 1947-48 | 185,525 | 1,108,000 | 369,400 |
| 1927-28 | 91,455 | 751,692 | 237,746 | 1948-49 | 185,009 | 1,277,000 | 376,400 |
| 1928-29 | 93,961 | 586,578 | 251,018 | 1949-50 | 222,050 | 1,286,000 | 382,000 |
| 1929-30 | 101,270 | 872,327 | 254,239 | 1950-51 | 338,877 | 1,228,000 | 396,000 |
| 1930-31 | 98,413 | 787,796 | 279,165 | 1951-52 | 247,995 | 1,360,000 | 420,000 |

* 80% of these fertilizers are used in sugarcane.

*Storage and wharf facilities provided by Ochoa Fertilizer Corporation of Puerto Rico for the newly organized Gonzalez Chemical Company which will manufacture anhydrous ammonia for the sugar industry.*

nitrogen mixed-analysis fertilizers, such as 18-0-6. Ammonium nitrate is not used much because of the high cost of handling, it being very explosive when improperly handled. Phosphorus is added in the form of superphosphate (20-percent P205) which is made in Puerto Rico from phosphate rock and sulfuric acid. Potassium is usually applied in the form of the muriate of potash (60-percent K20).

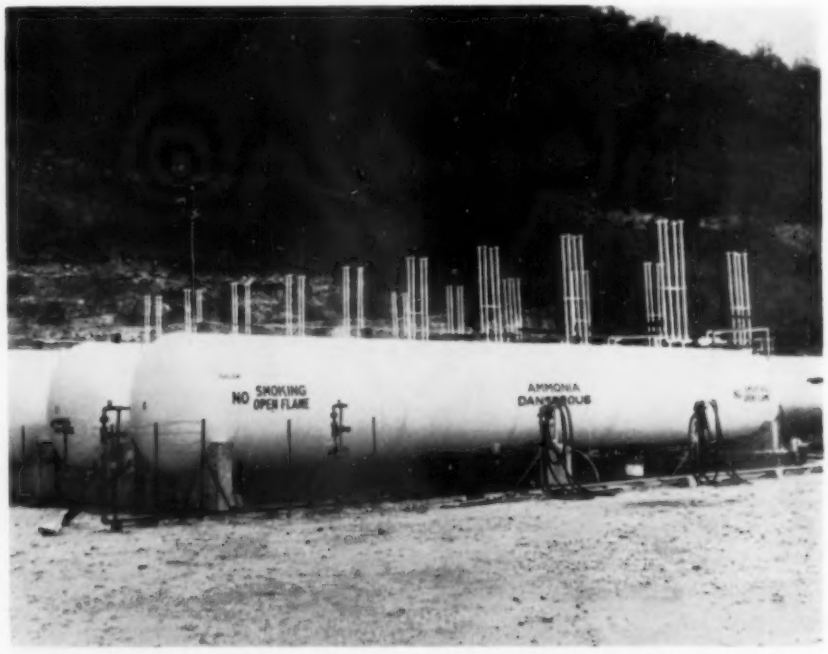
It speaks well for the sugarcane growers of Puerto Rico that their policy has generally been to use balanced complete fertilizer analyses on sugarcane to insure that none of the major elements becomes depleted from their sugarcane soils.

Fertilizer is commonly employed in one or two appliactions to the sugarcane by hand labor. The single application for plant canes is made after the cane has germinated and some rain has fallen, usually four to six weeks after planting. The single fertilizer application is made one to two months after cutting for the ratoom crop. Where two fertilizer applications are used, one is made after planting or cutting the cane, and the second approximately six weeks later.

Two innovations entered into the picture just at the end of the 1910-54 period; they will produce great changes in the usage of fertilizer in Puerto Rico. The first is the use of anhydrous ammonia, which was started in Puerto Rico on a commercial scale by Luce & Co., at Aguirre, in 1952. Anhydrous ammonia is applied in the soil as a gas while plowing, or in irrigation water. It provides large savings to the grower both in lower costs of nitrogen per unit and in application. Luce & Co., S. & C., Aguirre, and the Land Authority of Puerto Rico are now using aqua ammonia (20-percent N) on their cane crop. The use of aqua ammonia is being urged because of the savings to be realized in price per unit of N and less costly equipment needed to apply it, as compared to anhydrous ammonia.

The second innovation is the mechanization of the sugarcane fertilization. Mechanization of fertilizer application which began when anhydrous ammonia was applied mechanically is also being undertaken for solid mixed fertilizers. The use of new chemicals will make it possible for the Puerto Rican sugarcane grower to solve the problems of poorly cured, caked fertilizers, and hand applications of the fertilizer.

The sugarcane grower usually uses an average of 80 percent of the total fertilizers used in Puerto Rico. This means that the sugarcane grower is now applying to his soil about 180,000 tons of fertilizer per year. With proper mechanization of fertilization, lowering of other costs of production, and available markets for the sugar, the use of 200,000 tons and more of fertilizer per year by the Puerto Rican sugarcane grower may become an accomplished fact in the future. The trend in the past ten years indicates that the growth in the use of fertilizer in Puerto Rico is by no means at an end.




*Anhydrous ammonia, a popular and successful fertilizer used extensively in Puerto Rico is stored in pressure tanks owned by Gonzalez Chemical Company from which it is distributed to the growers.*

## Sugar Industry Technicians

The Seventeenth Annual Meeting of the Sugar Industry Technicians will be held in New York City on May 12-13, 1958.

Sugar Industry Technicians, formerly the Sugar Industry Engineers, came into existence in December 1940, with a membership of 15 engineers; R. S. Kent and F. M. Gibson were the organizers of the society. The initial constitution was adopted in April, 1941 by which time the organization comprised a membership of 38 engineers and chemists.

Current membership includes 38 corporate members and 145 associate members. A total of 144 technical papers have been presented at the annual meetings and distributed to the members.

The 1958 Annual Meeting will hear 15 technical papers during the two-day session, covering almost the entire field of sugar refining. While abstracts of all papers have not been received, the program will consist of recent developments in raw sugar handling; filtration; affination; granular adsorbents; evaporation; crystallization; packaging; storage; design and operation of automatic station control in a modern refinery. All of the major sugar refining companies are cooperating to make the May meeting an outstanding event.

Sugar Industry Technicians headquarters are located at 150 Nassau Street, New York City. Plans are under way for expanding the membership of engineers and chemists in the sugar refining industry. Foreign membership has increased since the last annual meeting. The Executive Committee is working unceasingly to maintain the high standards of the founders of S.I.T. and to arrange programs that will be of interest and benefit to all members.

■

### Fajardo Earnings Drop in 1956-57

As a result of the prolonged drought and the violent hurricane that damaged the Puerto Rican crop and exerted its influence on both world and domestic prices, net income after taxes for Fajardo Sugar Company dropped from $244,148 or 68c per share in 1956 to $36,810 or 10c per share for the year ended July 31, 1957. Gunnar Fromen, president, in making his annual report to the stockholders, referred particularly to the successful conversion of the company's factories from bag to bulk handling and the new bulk warehouse with a 45,000 ton capacity at Canóvanas which will be of substantial assistance to the company in meeting shipping strikes and in stabilizing prices when the market is temporarily depressed. Fajardo, said Mr. Fromen, is cooperating with growers to increase production and prepare for more mechanization in the fields. During the last crop a mechanical harvester was tested and is reported to show great possibilities.

■

### "Consistency, Thou Art a Jewel"

This phrase is the title of a king-size booklet recently produced by Savannah Sugar Refining Corporation. The title is followed by an asterisk (*)

The booklet is designed to acquaint distributors with the support furnished by Savannah through advertising on a consistent basis. A list of 146 daily newspapers in which Dixie Crystals are advertised is included. Other features of the booklet are a list of 12 trade papers in which consistent advertising is carried on, an outline of the work done by the company with 4H Clubs in their marketing territory and a selection of recipe books that have been prepared and distributed by Savannah Sugar. An outline of the company's point-of-purchase advertising forms a section of the booklet.

The theme, as stated by the company's sales department, is:

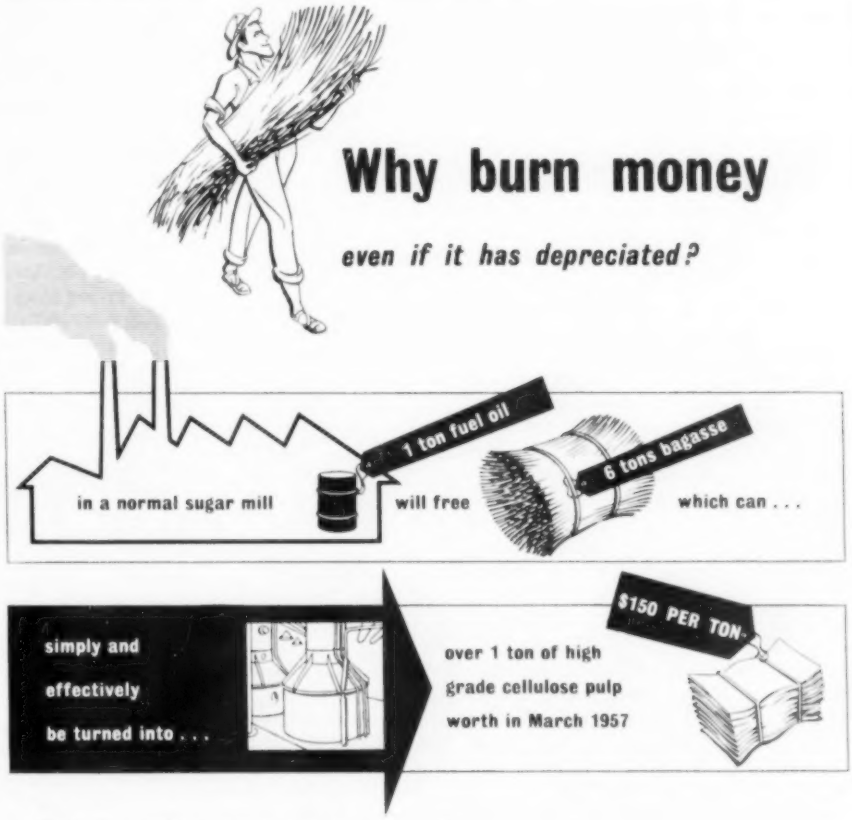
"Consistency is the essential ingredient of successful advertising! What an advertiser did last year or last month is not nearly as vital in moving merchandise off a grocer's shelf as what he did last *week*, and is doing *today*."

*Especially in advertising

■

### South Coast Dividend

Directors of The South Coast Corporation today declared a quarterly dividend of 12½ cents a share on the company's common stock, payable October 31 to stockholders of record at the close of business October 15, 1957.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# SUGAR ABSTRACTS

**Published under the Auspices of the International Society of Sugar Cane Technologists by Special Arrangement with SUGAR y AZÚCAR — Dr. O. W. Willcox, Editor**

## Agriculture

### Sugar Cane Irrigation in a Humid Region

HERBERT E. BUTLER, Sugar Bulletin, Vol. 35, No. 15, pp. 214-215 (1957).

In arid regions irrigation is essential; in humid regions it is regarded as merely supplementary to the local rainfall. But the farmers in such regions are often disappointed by their weather because (1) it does not rain, or (2) the rain just misses the farm, or (3) the total precipitation is not adequate, or (4) there was a good rain but it fell so fast that most of it ran off before much of it could sink into the soil, or (5) good rains are separated by long drouths.

The experiment station of the Louisiana State University has initiated a series of researches to see whether irrigation could be a worthwhile supplement to natural rainfall, which on a 25-year average would seem to be ample but which has been marked by a number of drouths which lasted in some cases up to 63 days, and many of which had obvious depressive effects on the sugar crop.

The plan of the first test (1955-56) included three treatments: (1) irrigation to maintain the moisture content of the soil between 50% and 100% of the soil's capacity; (2) half as many irrigations as in the first treatment, and (3) no irrigation. On the basis of previous experience it was established that in Louisiana the sugar cane, when growing most actively consumes 0.28" acre-inch of water per day. The rainfalls during June, July, August, September provided, respectively, 37.4%, 34.6%, 15.9% and 34.27% of the calculated need for moisture. The yields of cane obtained in this test were:

| Treatment | Cane, tons | Increase by Irrigation Cane, tons | Gross profit |
|---|---|---|---|
| 1 | 6 | 4.40 | $37.40 |
| 2 | 2 | 1.92 | 16.30 |
| 3 | 0 | — | — |

From the gross profit the cost of operations must be deducted; these will vary according to the circumstances of each case.

The soil on which this test was made was a relatively poor one. By appropriate use of fertilizer the profit could have been considerably higher. The point is that irrigation is most successful if combined with high fertilization, good drainage, and weed control. Irrigation may bring disappointment to an inefficient farmer who has not adequately prepared his land or has an inadequate supply of water for a good job.

■

### Varietal Trends in Natal

F. G. C. BREN, *South African Sugar Journal*, p. 359 (1957).

The main change in the varieties at present in commercial cultivation will almost certainly be in the direction of a steady replacement of the older Co. varieties by the newer N:Co's. This change was begun with the replacement of Co.281 by N:Co.310. Now Co. 301 is rapidly declining in importance, and the first signs that Co. 331—the last Co. variety to be distributed—is losing ground, have appeared. N:Co.376, which is adapted to a wide range of soil and climatic conditions, will probably come to occupy a large part of the area under Co. 301 and Co. 331. Unless N:Co. 310 should deteriorate, it is not likely to be superseded by N:Co.376 in the best areas, but it may be displaced in some of the not-quite-so-fertile areas. The cultivation of N:Co. 376 on a larger scale has shown that it does not have quite as much resistance to mosaic as it appeared to have when under trial.

N:Co.293 is likely to increase in popularity in areas where flowering is not profuse and smut disease is not prevalent. It is not only an easily-trashed variety but tends to form cane early. Its tendency to ratoon poorly when conditions for ratooning are not favorable may limit its spread.

The good points of N:Co.339 in some directions are counterbalanced by weak points in others. It ratoons well but germinates poorly; it is unusually tolerant of mosaic disease but also unusually susceptible; it is capable of giving good yields on the coastal sands but under certain conditions may flower early and profusely. It is capable of giving good yields in the higher altitude areas, but in these areas it may become seriously infected with red rot disease if attacked by borer.

N:Co.292 has neither the marked failings nor the exceptionally good points of N:Co.339. It is probably assured for some time to come of a place among the commercial varieties of Natal, but is not likely to attain major importance.

■

### Nematode Studies in Relation to Yield Decline of Sugar Cane Varieties

J. P. MARTIN, C. A. WISMAR and H. J. CARTER, Reports Hawaiian Sugar Technologists, Vol. 15, pp. 105-107 (1957).

Research conducted during the past two years relative to types, numbers and distribution of nematodes on various Hawaiian plantations definitely indicates that nematodes are playing a part in the problem of the decline of yield of sugar cane varieties. This statement is based on the extraction and identification of nematodes from more than 3,000 soil samples representing all plantations. Six species are reported, among which are three considered to be the most harmful to sugar cane. These are:

Pratylenchus sp., root-lesion nematode; chiefly external feeder but may enter and reproduce in grasses; quite common on grasses.

Heterodera sp., root-knot nematode; attacks many plants and reproduces in roots.

Trichodorus sp., external feeder; may inject toxins and cause stubby root growth; quite widely distributed.

The parasitic types of nematodes are sufficiently numerous in certain plantation fields to cause reduced yields. This conclusion has been verified by the fact that when areas showing high populations of nematodes were treated with fumigants, such as 1-2, dichloropropanes, ethylene dibromide, methyl dibromide, chlordane, or 1-2- dibromo- 3-chloropropane, there was a definite im-

provement in yield. Response to fumigation was not the same in all cases, probably due to the fact that some varieties are more resistant than others to these pests. The fumigants used in these tests are expensive, and much work remains to be done in working out the cost problem.

■

### Fungicides for Control of Red Rot in Sugar Cane

S. L. SHARMA and associates, *Indian Journal Sugar Cane Research*, Vol. 1, Part 3, p. 174-5 (1957).

Fungicides are reported to have been effectively used against several species of *Colletotrichum*, which cause the red rot disease. In work done by the Indian Central Research Station, three commercial fungicides: Blitox, Perenox and Spersul were given a trial in the 1955-56 season on plantings of Co. 453 raised from sets known to be infected with the disease. The fungicides were used as 1% solutions at the rate of 200 gallons per acre. Spraying was begun when the growing plants were showing red rot lesions on the leaves and stalks and continued through five intervals between July 1955 and February 1956.

From the data it appears that Spersul spray is the best of these fungicides for this work; Perenox is almost as good. These two were able to check the spread of the infection by 25.9% and 23.5%, respectively, as compared with the control plots.

## Factory Technology

### Further Results Obtained from the Defecation Process in Natal

C. VAN DER POL, Proceedings 30th Annual Congress South African Sugar Technologists Association, 1956, pp. 84-92.

In the past crushing season four other mills have followed two others in abandoning the sulphitation process in favor of the defecation process for production of raw sugar. Experience of these four factories has confirmed the advantages of simple defecation over sulpho-defecation. These advantages are lower production costs due to savings in chemicals, in labor, in maintenance of equipment, increase in capacity of evaporators, and adaptability to automatic control.

However, it was being urged that these apparent economies accompanying the change in clarification technique might also be accompanied by a decrease of ultimate sugar recovery, in which case the enumerated savings could be nullified, and research was started to determine that matter. A statistical study of boiling house performance showed no significant difference after the change-over to defecation. There was a decrease in the purity of the defecation molasses, but since this decrease was not accompanied by a drop in boiling house performance, it must be assumed that either the quality of molasses had increased due to better removal of non-sugars, or the nature of the non-sugars in clarified juice has changed so as to affect the Brix. There is no evidence that defecation removes more non-sugar, but there is evidence that for the same dry substance a sulphitation molasses has a higher Brix than defecation molasses. This phenomenon has been repeatedly observed. Hence, for the same true purity, a defecation molasses will have a higher gravity purity than a sulphitation molasses. This may appear somewhat confusing, but it affords no evidence that a defecation molasses is less easily exhausted than a sulphitation molasses.

The conclusion is that there is no room for suggesting that the lower production costs of the defecation process are nullified by a decrease of sucrose recovery from the juice.


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### Determination of Reducing Sugars

GEORGE P. MEADE, *Sugar Journal*, Vol. 20, No. 1, pp. 32-33 (1957).

The percentage of reducing sugars in blackstrap molasses is a matter of great commercial importance, and for years has been a continuing source of controversy, particularly as regards whether or not neutral lead acetate should be used in the analysis after inversion of the sucrose but before determining the reducing sugars.

Attention is called to a definite study of the subject by Emma J. McDonald at the U. S. Bureau of Standards (J. of the Assn. Official Agricultural Chemists, Aug. 1956), whose conclusions are stated as follows:

Clarification with neutral lead acetate has two opposite effects. By removing calcium, it raises the amount of reducing sugar found; by removing non-sugar reducing material it lowers the amount of reducing sugar found. Lack of uniformity in the effect of defecation with lead on the Lane-Eynon and the Munson-Walker methods shows that sources of error are not eliminated by defecation. However, the use of lead may be justified when making an analysis in which the quantities of dextrose and levulose are determined because of increased accuracy when the d.—l. ration deviates from 1. When general methods are used, the results will be arbitrary in that they assume that all reducing material present is invert sugar. Other objections are that defecation is time-consuming and does not remove all uncertainties. In routine operations concerning reducing sugar determinations, defecation appears to be an unjustified refinement because the amount of the lead deficant cannot be clearly defined and must be left to the judgment of the analyst. New, unpublished evidence obtained from the New Orleans Customs Laboratory shows that both the Lane-Eynon and the Munson-Walker methods give the same results on both clarified and unclarified molasses.

### The Reich Process for Molasses Elaboration

GUSTAVE T. REICH, *Sugar Journal*, Vol. 26, No. 4, pp. 38-39 (1957).

Three distilleries operating in Cuba are processing 150,000 gallons of blackstrap molasses by the Reich process for the production of absolute alcohol and recovering about 30,000 pounds of dried distiller's yeast daily. In order to obtain a high quality yeast, the molasses is diluted with water to a concentration suitable for the crystallization of hydrated calcium sulfate under controlled conditions of time, temperature and pH. The main chemicals employed in this treatment are ammonium sulfate and sulfuric acid; the object is to obtain calcium sulfate having a monoclinic structure. By this treatment 80% of the lime (CaO) can be precipitated and removed in solid basket centrifugals; whereas, an unbalanced operating procedure would remove only 20% of the lime. The molasses thus processed is diluted with water and fermented with pure yeast. The fermented mash passes through separators, and the beer is dealcoholized in the still; the separated yeast is washed, dried and packed in paper bags. It now contains over 40% protein, 7 to 9% ash, and noteworthy proportions of the vitamins thiamin, riboflavin, pantothenic acid, niacin, biotin, cholin, and a high percentage of amino acids. The yeast from these distilleries is sold in Cuba and abroad as cattle and poultry feed, and can be converted into human food which could be of particular interest in regions where malnutrition is prevalent on account of scarcity of proteinous foods.

Since yeast is required for alcohol production, there is no cost charge for the molasses used. However, an additional quantity of molasses would increase the production of yeast without increasing alcohol production.

### On "'Running Out' of Cane Varieties" (*Sugar y Azúcar*, Aug. 1957)

Mr. Norman J. King, Director of the Bureau of Sugar Experiment Stations, Queensland, writes to the editor of *Sugar y Azúcar:*

"It is desired to draw your attention to an abstract on page 32 of your August 1957 issue. The writer of this letter is author of the article abstracted and, as author, I have strong objections to your abstractor reading something into the article which was never implied. The final phrase in the abstract, ". . . and that the 'running out' is really due to a natural decay of vital vigor . . ." is completely meaningless and has no scientific significance. . . . An abstract has only one meaning and it should not contain the comments of the abstractor—except as a footnote."

* * * *

In reply, the abstractor admits that he is responsible for the last clause of this abstract. Unfortunately, his remark was not enclosed in parentheses to indicate that the clause was to be taken as editorial comment.—EDIT


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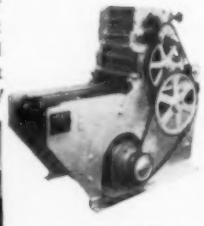

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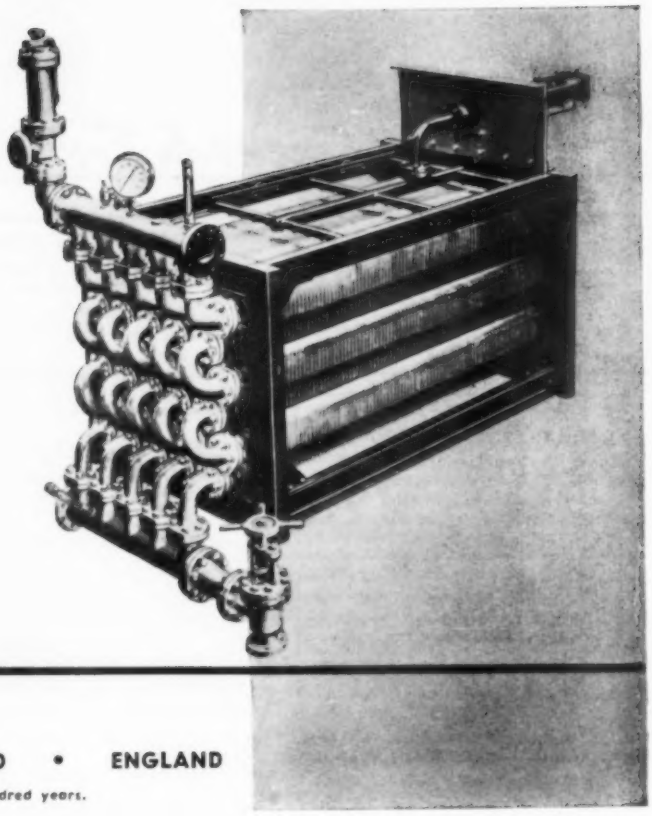

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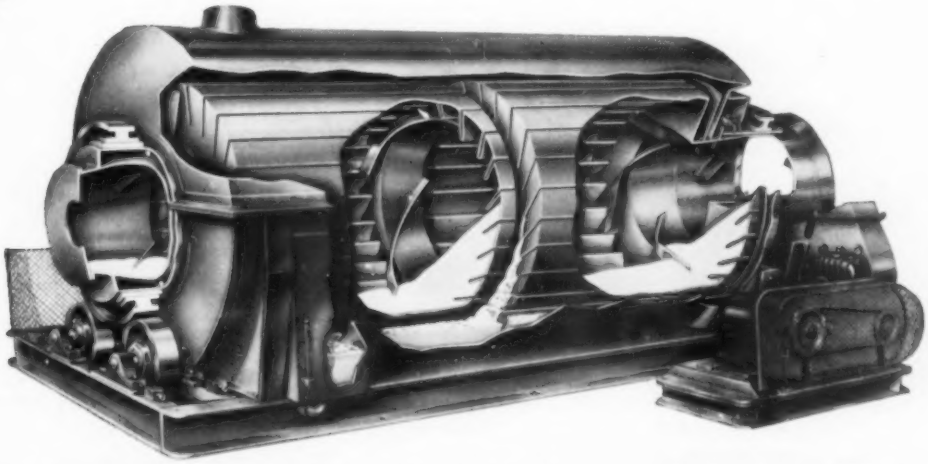

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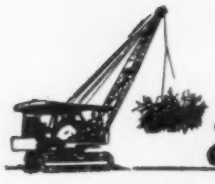
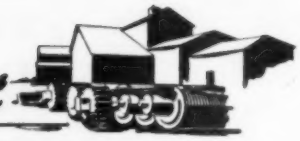


# Equipment & Service Market

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## Zerban Group Hears Dudley Smith

Dudley Smith, vice president of the Association of Sugar Producers of Puerto Rico who makes his headquarters in Washington, addressed the Zerban Sugarmen's Association on November 13th at the Chemists Club in New York. Subject of Mr. Smith's talk was the sugar industry in Viet Nam which, he pointed out, was extremely primitive, and a consideration of methods by which the industry could be improved in efficiency without radical changes that would revolutionize technical procedures common to the country. Mr. Smith has recently returned from an extensive tour of Southeast Asia. A distinguished foreign visitor at the luncheon was Sr. Eduardo Titus, general manager of the refinery at Viñar del Mar in Chile, president of the Engineers' Club of Valparaiso and Dean of the Catholic College of Chemistry in that city.

## Facts About Sugar

(*Continued from page* 31)

tober were encouraging in spite of the green appearance of the fields.

"A few mills started grinding operations in the middle of the second week of October. Sucrose content of the cane was good for the first few days but rapidly went down. Late September rains and early October rains, warm days and warm nights continued to promote growth. The cane was still filling in top growth."

The theory advanced for poor sugar recoveries is generally agreed upon. It is a high percent of trash and plenty of mud. According to Mr. Lauden, trashy cane holds more mud than clean cane. "During rainy periods," he says, "mud is always a problem, but add the mud to the trash and recoveries go down."

Trash has become such a great problem this year that a special committee has been appointed by the President of the American Sugar Cane League to try to find a way to get trash-free cane to the mills. Heading this committee is the very capable Roland Toups, of the South Coast Corporation. The Committee actually does not have enough time left this season to accomplish very much, but it is hoped that the ground work will be laid for some definite recommendations concerning the 1958-59 crop.

While on the subject of poor yields, it is interesting to note that official figures on the progress of the milling and harvesting operation issued by the USDA office in Alexandria, La., show that through the week ending November 23, 1957 the Louisiana mills had ground 3,025,886 tons of cane, which is about half of the crop, and produced 422,245,874 pounds of sugar. Figures for the same period last season through the week ending November 24, 1956 show that 3,265,861 tons of cane had been ground to that date and that the production of sugar had amounted to 513,573,856 pounds.

By the time this report appears in print, the USDA will have issued its initial consumption estimate for 1958. Louisiana and Florida have joined in recommending that the estimate be conservative in size, that it be made at an early date, that the announcement accompanying the estimate indicate that the price of sugar is too low in relation to the general cost of living, and that the estimate be increased only when conditions clearly indicate that additional sugar will be needed.

---

Receipts of offshores raws at New Orleans during the month of November were small, reflecting the movement of the Louisiana crop. The American Sugar Refinery took in 126,119 bags of Cubas and another 22,988 bags of Cubas went to Henderson. No other offshore receipts were recorded.

### Cuban Repairs Completed

During the past few months the Cuban Sugar Industry has been polishing itself up in preparation for what promises to be a record Campaign year in 1958. Following a Government Directive, repair work was commenced in many mills, the majority of which are already prepared to begin grinding. Only in the Limones mill was there registered any trouble in making the necessary repairs, and there the Federacion Nacional de Trabajadores Azucareros (F.N.T.A.), has offered to lease the mill from the owners—in this case Havana University—so as to make the necessary repairs and permit the mill to function normally during the Campaign.

The prospect of a record Campaign has been received with limited optimism in Cuban sugar circles. The threat of unlimited sabotage by the anti-Batista groups has cast a pall on what otherwise would be cause for extremely favorable forecasts.

Nevertheless, the conservative business-circles in Havana believe that the government will guarantee the safe operation of the 1958 Campaign and that it will progress normally, giving Cuba a record production.

### U. S. Concentrates on Beet Hybrid

Agronomists in a half-dozen states are working at their microscopes, calculating machines and in greenhouses attempting to crack a multi-million dollar question in agriculture: can a commercial sugar beet hybrid be grown? And will it yield more sugar, produce the same high tonnage as present varieties and resist plant diseases?

The answer seems to be affirmative. Preliminary tests indicate it is technically possible to hybridize sugar beets on a commercial scale. But the trickier and perhaps more important question of whether these beets will match existing commercial varieties still is unsolved.

Research headquarters for this highly technical problem of plant genetics and pathology is the Beet Sugar Development Foundation in Fort Collins, Colorado, heart of the second most productive sugar beet area in the country.

Unique among agricultural industries, the foundation combines research facilities of 15 beet sugar companies in the United States and Canada, agronomists of the U. S. Department of Agriculture, scientists in colleges and universities and 500 members of the American Society of Sugar Beet Technologists in almost every state of the union and 17 foreign countries.

The foundation supervises and coordinates research on hybridizing the sugar beet and directs studies of a host of other problems relating to the propagation of *Beta vulgaris*, technical name for the sugar beet.

"Our goal," says engineer Jim Fischer, secretary-treasurer of the foundation, "is to duplicate the work of corn scientists whose hybrids increased yields 20 to 25 per cent.

"Such an increase for our industry would raise the value of a 30-acre crop of sugar beets by $1500. It would boost yearly farm revenues by $30,000,000—and this is a conservative estimate," Fischer said.

One of the nation's top plant genetecists, Dr. Leroy Powers, head of the USDA experiment station at Fort Collins, says without qualification:

"There is no reason why we cannot equal the gains of corn with a sugar beet hybrid. In the next 10 years hybrids will be grown commercially. It will be long, slow work but we are confident we can produce commercial hybrids."

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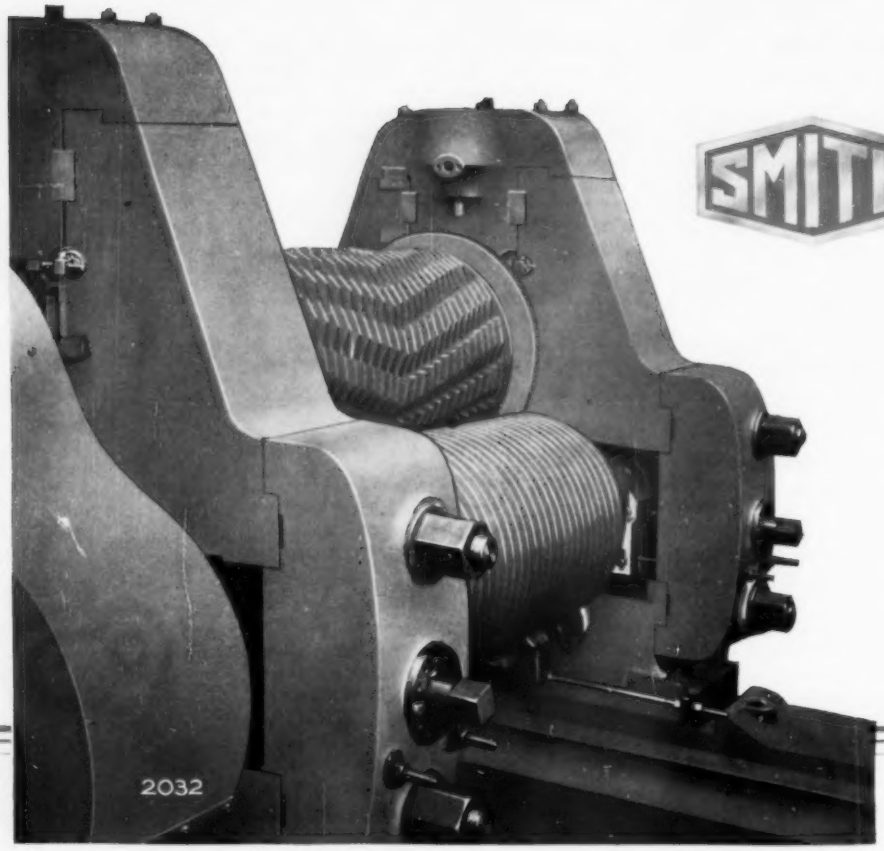


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AZÚCAR

Enero 1958

*Revista Industrial Rusa Anuncia*

# La Producción de Papel de Bagazo en la China

La revista industrial de Moscow "Bumazhnaya Promyshlennost" (Industria de Papel) informa que el gobierno de Peking tiene en proyecto un aumento importante en la utilización del bagazo de la caña de azúcar para la producción de papel de periódico y de otros tipos. Como dispone de bastante caña de azúcar pero tiene muy poco panel, China está tornando a la caña para satisfacer sus necesidades de tan importante producto como el papel. La caña es preferida sobre el bambú, el algodonero y otras cosechas anuales, las cuales también se usan en la producción de papel además de una pequeña cantidad de pasta de madera.

La revista rusa informa que el procedimiento empleado en la producción de papel de bagazo fué originado en la China según lo describe S. P. Foteyev, autoridad rusa en la producción de papel.

La cosecha de caña se recoge entre fines de otoño y principios de invierno y el bagazo se separa y clasifica como grueso, regular y fino, se embala en fardos de 55 a 132 libras y se amontona en pilas según su clasificación. Luego se embarca a la fábrica de papel por agua, por ferrocarril o por carretera, la que mantiene una existencia de tres meses en pilas de 500 a 1,000 toneladas. La caña se pesa al llegar a la fábrica y se vuelve a pesar inmediatamente antes de molerla, y se determina su contenido de humedad en cada turno.

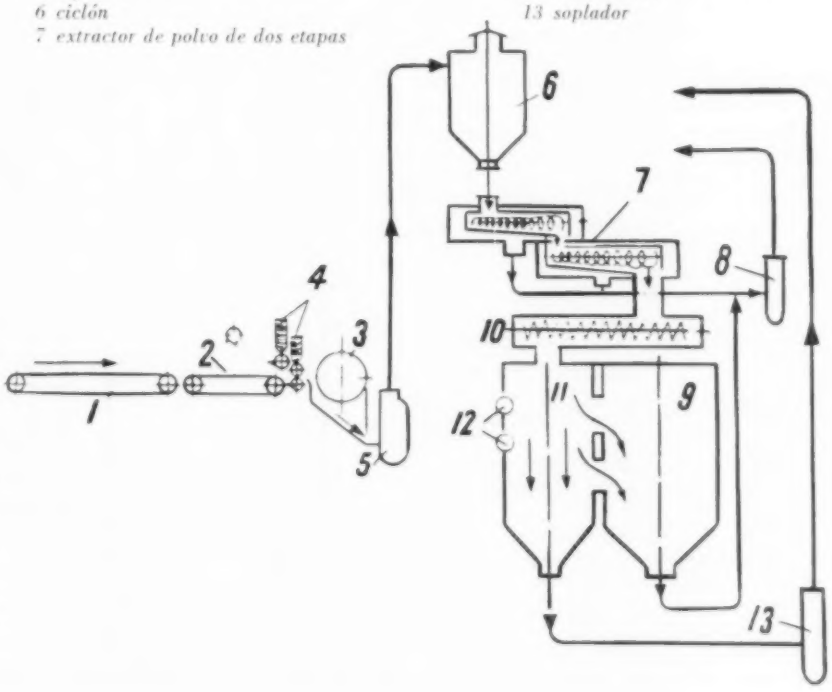
En la fábrica de papel, el bagazo se pasa primeramente por un proceso de limpieza en el departamento preparatorio. Luego se pica en briznas de 1.18 pulgadas de largo a lo sumo, se cierne y se envía a las tolvas para ser alimentado a los digestores. La planta de limpieza, donde el bagazo fluye en dos columnas paralelas de 16 a 20 toneladas de capacidad por hora, se ve ilustrada en el diagrama inserto, Figura 1. El bagazo es distribuído uniformemente por trabajadores en el transportador (1), de donde pasa al alimentador (2) que lo entrega a la picadora (3). El bagazo avanza bajo la presión de rodillos de resorte, y es picado por la rueda de la picadora de 6.5 pies de diámetro provista de cuchillas de acero. La rueda de la picadora es movida por un motor eléctrico de 80 a 100 kvt que gira a 220-230 rpm. El bagazo entonces pasa a la tolva que descarga en el soplador (5) y de allí pasa al ciclón (6) de donde es enviado por una tubería de 12 pulgadas al separador de polvo (7). Este separador se compone de cernedores giratorios dispuestos en envolventes herméticos y conectados al soplador (8) por tuberías. La succión creada entre los cernedores y sus envolventes facilita la remoción del polvo. Los expulsores en espiral que giran a 150-165 rpm dentro de los envolventes de los cernedores mezclan y expulsan el bagazo picado por la tubería de 12 pulgadas al transportador en espiral (10) que entrega una corriente uniforme al extractor vertical de polvo (11). Al pasar por el extractor (11), las partículas finas y polvo de bagazo son separadas por corrientes de aire producidas por los ventiladores (12). El material cernido desciende lentamente al fondo cónico del extractor de polvo, y de allí va al soplador (13) que lo envía al ciclón instalado sobre la tolva del departamente de elaboración. Esta tolva puede recibir más que suficiente bagazo para cargar el digestor. En el proceso de limpieza, el bagazo pierde más de 3 a 3.5% de su peso, en cuyo proceso se consumen de 10 a 12 kvt-horas de energía eléctrica por tonelada de caña.

La celulosa de caña es tratada principalmente por el proceso de sulfitación. El ácido se prepara con una base de magnesio, ya que el calcio no es tan adecuado para este fin. La magnesita se alimenta en forma de polvo. Se mezcla con agua en mezcladores verticales de unos 2,120 galones de capacidad; la suspensión es alimentada por bomba. Las cámaras de ácido trabajan con piritas. Están dispuestas en líneas paralelas con los dispositivos acostumbrados para la absorción de $SO_2$, principalmente del tipo Hagglund. La absorción de $SO_2$ es por el principio de contracorriente. En la preparación de 212 galones de ácido crudo se consumen de 77 a 88 libras de piritas, 10.000 a 10.500 galones de agua y 25 a 28 kvt/horas de energía eléctrica.

Una característica de la cochura de celulosa de caña es que se puede hacer con ácido de poca fuerza, el cual es bombeado

Fig. 1. *Diagrama del Departamento de Preparación*

*1 transportador de banda*
*2 transportador alimentador*
*3 picadora de caña*
*4 rodillos de resorte*
*5 soplador*
*6 ciclón*
*7 extractor de polvo de dos etapas*
*8 soplador*
*9 colector de polvo*
*10 transportador en espiral*
*11 extractor vertical de polvo*
*12 ventiladores*
*13 soplador*



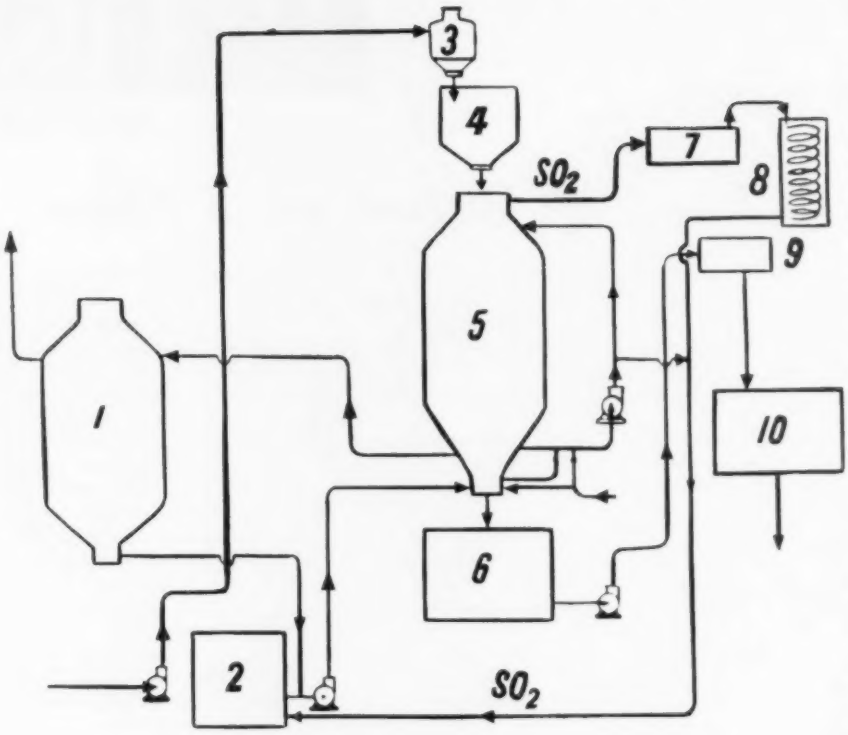



Fig. 2. *Diagrama del Departamento de Elaboración*

*1 depósito*
*2 depósito de ácido*
*3 ciclón*
*4 tolva*
*5 digestor*
*6 foso de descarga*
*7 permutador térmico*
*8 refrigerador*
*9 separador*
*10 depósito de celulosa sin cerner*

El departamento de tachos ilustrado en el diagrama inserto, Figura 2, dicen que funciona satisfactoriamente, aunque sus elementos de circulación no incluyen precalentador.

Aunque el sistema de cochura es igual en todas partes, el rendimiento de los tachos varía en las distintas fábricas. El período de cocción dura de 1 hora y 40 minutos a 2 horas y 45 minutos. La Tabla II indica el tiempo invertido en las diferentes operaciones (en horas y minutos) en una de las principales fábricas de papel en la China.

Las temperaturas se ajustan a cierto régimen. Las temperaturas y presiones se pueden elevar continuamente sin detenerse para prolongar la maceración. La temperatura final se mantiene dentro de los límites de 320 a 327.2° F. La presión en el tacho durante la cochura no pasa de 8.5 libras por pulgada cuadrada, la que normalmente se mantiene regulada. De acuerdo con los in-

simultáneamente con la alimentación del bagazo picado; ambos requieren alrededor de una hora. El ácido es alimentado por un sistema de circulación en caliente a 185-194° F. El contenido total de $SO_2$ en el ácido en el momento del bombeo es aproximadamente tres por ciento; al comenzar la cochura es de 2.6 a 2.8%. La Tabla I indica la cantidad de bagazo y ácido que se carga en tachos de diversas capacidades.

"Al parecer, la reducción de la cantidad de ácido digestor y la limitación de su contenido de $SO_2$ libre crea condiciones más benignas para la cochura del bagazo, lo que aumenta, a la vez, el rendimiento de fibra debido a la retención en la misma de mayor cantidad de pentosanas," dice el ingeniero ruso Foteyev. "La perfecta limpieza del bagazo, la carga simultánea del bagazo y ácido y la conservación de una relación constante de $SO_2$ ligado y libre en el proceso de cochura contribuyen positivamente a aumentar el rendimiento de celulosa y a mejorar su calidad. La instalación de elementos de circulación en los tachos también contribuye a elevar el rendimiento de celulosa de la caña."

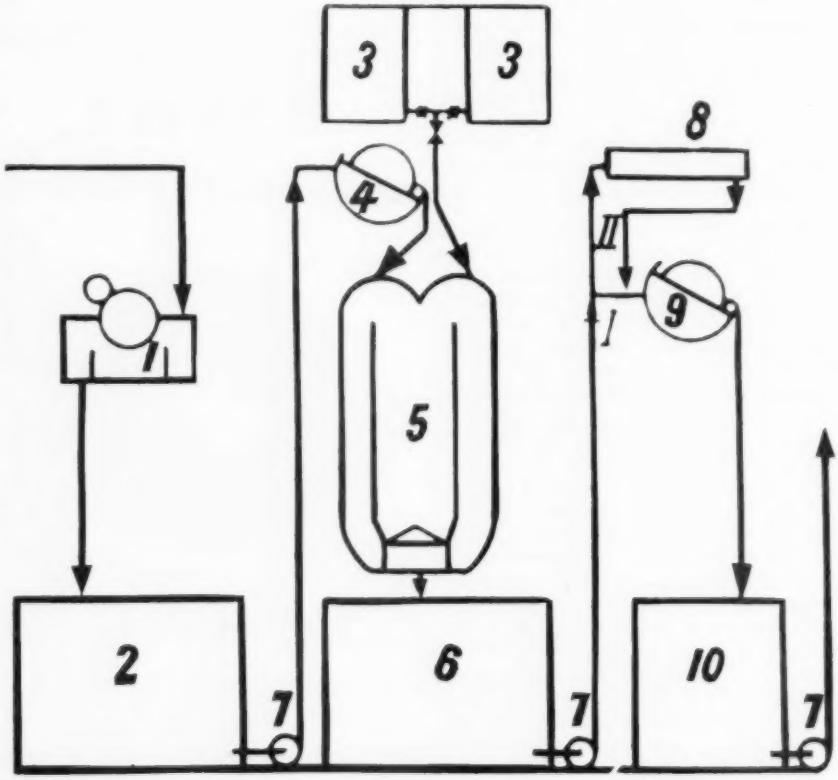



Fig. 3. *Sistema de Blanqueo de Una Etapa*

*1 condensador*
*2 depósito de celulosa sin blanquear*
*3 tanques medidores de solución de cloruro*
*4 filtros de celulosa sin blanquear*
*5 batidores de blanqueo*
*6 depósito de celulosa blanqueda sin lavar*
*7 bombas centrífugas*
*8 cernedores planos*
*9 filtros de celulosa blanqueada*
*10 depósito de celulosa blanqueda y lavada*

Tabla 1.

| Carga | Capacidad del Tacho en Galones 40,000 | 41,400 | 55,000 |
|---|---|---|---|
| Toneladas de bagazo | 28 a 30 | 29 a 32 | 39 a 42 |
| Galones de ácido | 23,200 a 23,800 | 25,600 a 26,400 | 35,600 a 37,000 |
| Por ciento $CO_2$ total | 3.0 a 3.05 | 3.1 a 3.2 | 2.6 a 2.8 |
| Por ciento $CO_2$ ligado | 2.0 | 2.3 | 1.9 a 2.0 |
| Rendimiento de celulosa en toneladas | 14.5 a 15.5 | 15.0 a 16.0 | 18.0 a 20.0 |

formes de fábrica, en la cochura de una tonelada de celulosa de caña se consumen de 4,250 a 4,280 galones de ácido, 3,160 a 3,420 galones de agua (incluyendo la empleada durante la descarga), 18 a 20 kvt-horas de energía eléctrica, y 0.4 a 0.5 toneladas de vapor (excluyendo el consumido en calentar la pasta de bagazo antes de iniciar la cochura).

La celulosa se descarga a una presión en el tacho de 2.75 libras por pulgada cuadrada, con 790 a 1,055 galones de agua caliente a 131-140° F; se limpia del mismo modo que la pasta de madera sulfitada.

De acuerdo con las estadísticas de las fábricas de azúcar en la China, la producción de una tonelada de celulosa sin blanquear, con un contenido de humedad de 10% y un rendimiento de celulosa de 51%, requiere de 4,830 a 5,050 libras de bagazo, 550 a 590 libras de piritas (42%), 205 a 215 libras óxido de magnesio (90%), 42,000 a 47,500 galones de agua dulce, 180 a 190 kvt-horas de energía eléctrica, 1.2 a 1.4 toneladas de vapor.

Actualmente se está estudiando en la China el fomento de nuevos usos para los alcalís de sulfito derivados de la elaboración de celulosa de caña. Estos alcalís contienen gran cantidad de substancias inorgánicas, las que se entiende dependen del alto contenido de ceniza y escaso contenido de azúcar en el bagazo.

La celulosa de caña es de color gris y contiene gran cantidad de suciedad, por lo cual su uso es limitado y es inservible para la producción de papel de periódico o de escribir. En el blanqueo de esta celulosa se emplea cloruro, hipoclorito de calcio y cloruro de cal, cuyo último se usa extensamente hoy día porque se obtiene con mayor facilidad.

El proceso de blanqueo no sólo blanquea la fibra sino que reduce su contenido de suciedad y eleva su pureza química, lo que mejora la calidad del papel y aumenta su durabilidad.

La celulosa de caña se clasifica como dura, regular y blanda, según la intensidad de cochura. La celulosa dura se produce muy raras veces por su alto contenido de suciedad y se emplea solamente para ciertos tipos de papel y cartón que requieren menos blancura y pureza; el blanqueo de la celulosa dura se considera impráctico.

La celulosa de dureza regular se emplea extensamente. Sus características incluyen: pureza permangánica de 65 a 90, y contenido de lignina de 2.5 a 4.5%. Esta celulosa se blanquea fácilmente y sus fibras son bastante fuertes; el papel que de élla se obtiene es de buena calidad y se imprime bien.

El proceso de blanqueo de la celulosa de caña suele llevarse a cabo en una sola etapa, el que no difiere en principio del método

Tabla 2.

| Operación | Horas : Minutos |
|---|---|
| Carga del bagazo | 0 : 52 |
| Batición o mezcla (la temperatura asciende a 160° C ó 320° F) | 1 : 30 |
| Cocción | 2 : 25 |
| Baja de temperatura | 0 : 35 |
| Descarga | 0 : 28 |
| Período total de la templa | 5 : 56 |
| Temperatura inicial 92° C ó 197.6° F | |
| Temperatura final 156° C ó 312.8° F | |

empleado en el blanqueo de pasta de madera. Para el blanqueo se usan dos batidoras de tres pasadas generalmente del tipo Belmar, provistas de diversos dispositivos para revolver la masa. El proceso de una etapa dicen que es sencillo, conveniente y continuo, cuya operación no requiere personal experto. La Figura 3 muestra el sistema en forma esquemática.

Informan que de acuerdo con la experiencia de fábricas de azúcar en la China se ha establecido que la celulosa de caña debe contener de 12 a 15% de pentosana o más. El aumento en el contenido de pentosana permite producir papel de imprenta y de escribir de mayor resistencia mecánica.

Las estadísticas demuestran que el blanqueo de una tonelada métrica de celulosa de caña de una entrada de 2,280 a 2,300 libras de celulosa sin blanquear requiere de 352 a 374 libras de cloruro de cal (33%), 0.4 a 0.6 toneladas de vapor, y 50 kvt-horas de energía eléctrica. El consumo de agua para el lavado de una etapa sin cerner no pasa de 26,420 galones. La pérdida de fibra en el blanqueo hasta 75 a 80% es de 3.5 a 4.5%; cuando la blancura se eleva a 85%, la pérdida de fibra llega a 6 o 7%.

■

# Método para Comprobar el Balance de Sacarosa en Fábricas de Azúcar

**Por Jorge A. Acosta**

La norma generalmente seguida en fábricas de azúcar para dar cuenta de la sacarosa en el jugo calculada por el peso del jugo mixto consiste en sumar los contenidos de sacarosa en el azúcar terminado y en la miel final y calcular las pérdidas de sacarosa en la torta de filtro por análisis de la cachaza y cálculo de su peso. La diferencia entre la sacarosa calculada por el peso del jugo mixto y la suma de los tres valores mencionados representa las pérdidas de sacarosa no determinadas.

Las pérdidas de sacarosa en el bagazo se determinan separadamente por análisis y determinación del por ciento de bagazo producido por la caña, como sigue: El peso de la caña, más el peso del agua de maceración, menos el peso del jugo mixto deben darnos la cantidad de bagazo. En el caso de cañas lavadas, al peso de la caña se le agrega una cantidad predeterminada que representa el agua de lavado que entra en el tándem adherida a la caña.

Un defecto de las prácticas mencionadas es que no toman en cuenta la sacarosa en la caña molida, aunque durante la operación de molienda se toman constantemente muestras del primer jugo y éste se considera representativo de la calidad de la caña en proceso de molienda. Ahora veamos lo que sucede cuando se toma la sacarosa en el primer jugo para comprobar el balance de sacarosa indicado en los informes de fabricación.

Sería muy interesante que algunas fábricas de azúcar comprobasen sus informes finales de varias cosechas anteriores, como sigue:

Primero, debemos reconocer que no es posible alimentar exactamente 2,000 libras de caña al tándem por cada tonelada de peso debido a la evaporación, derrames, acción de las cuchillas y desfibradoras de caña, basura y desperdicios en general. Lo que habrá que deducir dependerá del tándem en cada caso, pero cualquier valor entre cuatro y doce por ciento sería aceptable, de modo que para fines de ilustración

*El balance de sacarosa en la fábrica de azúcar es una medida importante de la eficiencia de trabajo y debe ser determinado por el peso y análisis de la sacarosa introducida en la fábrica y representada por el azúcar terminado y las pérdidas en el proceso de elaboración. Para el cálculo de dicho balance se sugiere la fórmula aquí descrita.*

puede suponerse que una deducción de ocho por ciento significa que del peso total de la caña, en el tándem sólo entrará el 92%. Si el informe del laboratorio indica que la caña tiene un contenido promedio de fibra de 16%, indica que 1 — .16 = 84% del peso total de la caña representaría jugo. Así que si las muestras de jugo acusan un contenido de sacarosa promedio de .15, significa que 200,000 toneladas de caña deben producir (200,000 x 2,000 x .92 x .84 x .15) libras de sacarosa si se pudiese extraer el 100% del jugo en la caña. Como esto resulta imposible, sólo tenemos un factor responsable de las pérdidas, que es, desde luego, el bagazo. Ahora supongamos que el informe de laboratorio indique que el bagazo representa 35% de la caña, con un promedio de sacarosa de tres por ciento. Esto significa que tomando los datos de laboratorio en todo caso, la diferencia entre (200,000 x 2,000 x .92 x .84 x .15) y (200,000 x 2,000 x .92 x .35 x .3) representaría la cantidad total de sacarosa llevada del tándem al departamento de elaboración y debiera ser equivalente, dentro de límites razonables, al balance de sacarosa combinado de la cantidad total de libras de sacarosa en todo el azúcar terminado, más el total de libras de sacarosa en todas las mieles finales, más el total de libras de sacarosa perdida en la torta de filtro, más las pérdidas totales indeterminadas en libras de sacarosa, todas tal como se indican en los informes de producción finales. En la comprobación del balance de sacarosa tal como se indica, las variedades de caña no deben producir diferencia alguna; sin embargo, cuando el sistema de recolección ha sido cambiado de manual a mecánico, conviene tomar en cuenta mayor margen para la basura y hojarasca en la caña y, por lo tanto, se debe conceder mayor porcentaje para la caña alimentada al tándem.

Si por el balance de sacarosa indicado en los informes de producción no se puede dar cuenta de toda la sacarosa recibida por el tándem tal como lo indica este método de comprobación, puede significar que las pérdidas de sacarosa en el bagazo son realmente mayores que las indicadas en los informes de producción.

Si las pérdidas de sacarosa en el bagazo parecen ser razonables, es posible que las pérdidas indeterminadas dadas en los informes de producción sean demasiado bajas. Esto también puede suceder cuando el peso del jugo no es el correcto y el departamento de elaboración recibe más sacarosa que la indicada en los informes de producción, en cuyo caso el porcentaje de bagazo será demasiado alto.

Si los diversos contenidos de sacarosa arrojan un valor mayor que el cálculo de sacarosa introducida en el tándem, será necesario tomar un factor mayor de 92% para dicho cálculo.

Por este método de comprobación del balance de sacarosa se pueden obtener muchos datos interesantes, y procediendo lógicamente se podrán descubrir y eliminar las pérdidas y desperdicios.

Todo técnico azucarero versado en la operación de fábricas de azúcar sabe que ocurren pérdidas de sacarosa normales e inevitables, ya sea por inversión, baja de pureza, o por causas físicas o mecánicas, como limpieza del equipo, fugas de bombas y válvulas, averías y reparaciones del equipo, derrames, polvo volante, arrastres, y hasta cierta cantidad utilizada por empleados de la fábrica. Resulta absurdo, por lo tanto, no aceptar una cantidad razonable de pérdidas no determinadas.

Algunas fábricas de azúcar emplean métodos de análisis que no son muy exactos, por lo cual acusan pérdidas de sacarosa en el bagazo sorprendentemente bajas; otras emplean métodos inadecuados para pesar el jugo y calculan que la cantidad de sacarosa entregada al departamento de elaboración es mayor que la cantidad verdadera, por lo cual sus pérdidas de sacarosa no determinadas parecen ser mucho más bajas de lo que en realidad son (y a veces hasta acusan aumento), lo que afecta el coeficiente de extracción y da lugar a informes de fabricación que no reflejan las pérdidas de sacarosa normales que pueden ocurrir en el proceso de fabricación.

Como medio de control más adecuado se sugiere que se mida y se tomen muestras del jugo clarificado, y que la diferencia en la cantidad de sacarosa en el jugo crudo y en el jugo clarificado se mida y se acepte como pérdida de sacarosa en la torta de filtro en el departamento de elaboración, siempre que éste no reciba devoluciones al jugo de una refinería.

Anotando las pérdidas en la torta de filtro según se indica, y cotejando cuidadosamente el trabajo del filtro con la determinación analítica de la torta, se podrán obtener valores de pérdidas más exactos.

Este mismo sistema se podría aplicar a refinerías, donde se toma muestra del crudo recibido y se pesa, en cuyo caso también se podría tomar muestra del licor filtrado y se podría pesar antes de enviarlo a los tachos al vacío. La diferencia entre el contenido de sacarosa en el filtrado y el azúcar crudo se podría considerar como la pérdida de sacarosa en los lodos de refinería. Desde luego, el agua de lavado de la torta de filtro, las espumas, etc., tienen que emplearse para disolver el azúcar crudo, conservándolas en la refinería.

■

## Dipalmitato—El Primer Agente Tensoactivo Derivado del Azúcar

El primer agente tensoactivo derivado el azúcar para uso en la industria azucarera lo está produciendo la Berkeley Chemical Corporation en su planta experimental en Berkeley Heights, New Jersey.

Este producto, que se venderá bajo el nombre de "Sucrodet D-600", es un dipalmitato de sacarosa cristalizada, originalmente desarrollado para uso en las industrias de alimentos, farmacéutica y de cosméticos.

Dentro de pocos meses, la Berkeley proyecta seguir el Sucrodet D-600 con ésteres sacaríferos derivados de los ácidos esteárico, oléico, mirístico y láurico.

## *Se Proyecta Una Fábrica de Azúcar de Remolacha y de Caña Combinada*

# Expansión de la Industria Azucarera en Turquía

**Por Tarik M. Ozil**

TURQUÍA se está convirtiendo en un poderoso competidor entre los países productores de azúcar del mundo. Comenzando su producción azucarera en 1926 con dos pequeñas fábricas, para la campaña de 1933-1934 contaba con cuatro fábricas con una capacidad conjunta de 58,600 toneladas métricas. La diferencia entre su producción y más alto consumo se venía cubriendo con importaciones hasta la adopción de su autarquía o independencia económica. Entonces el consumo de azúcar quedó limitado a la producción nacional y sujeto a precios fijos; en 1941, el azúcar se vendía al precio fijo de 81 centavos la libra en la fábrica.

En 1952 la autarquía fué modificada en un esfuerzo por lograr que la producción nacional igualase la demanda. Aunque en 1956 el país contaba con 15 fábricas con una capacidad nominal conjunta de 25,000 toneladas métricas de remolacha al día, la producción anual no excedía de 276,000 toneladas métricas de azúcar refino. De los 306,000 acres sembrados a remolacha, solamente el 72 por ciento de la cosecha era aprovechable.

La explicación de lo anterior está en el escaso desarrollo del país y en la necesidad de tener que depender del favor de Deméter para una cosecha abundante ante la falta de tecnología moderna. A pesar de estas dificultades, la producción en 1956 (vendida al precio de 32 centavos la libra de azúcar) superó el consumo, dejando un sobrante de 12,000 toneladas métricas de azúcar para la exportación. En 1957, la extensión sembrada fué aumentada a 370,000 acres, y se anticipa que en la próxima campaña el sobrante de azúcar para la exportación será considerablemente mayor. De este modo, Turquía podrá pagar en moneda metálica las deudas incurridas en la importación de equipo para nuevas fábricas.

Lo cierto es que en Turquía se consume poco azúcar, su consumo en 1956 siendo 221 libras por persona. (En precio, una unidad de azúcar equivale a $2\frac{1}{2}$ unidades de pan, que es el sustento principal.) Pero la constante mejora en la alimentación del pueblo se ha reflejado en el aumento de consumo de azúcar. El consumo de 120,000 toneladas en 1949 fué más que duplicado en 1956, con 245,000 toneladas.

Un estudio realizado en 1952 indicó que se podría anticipar con certeza un rendimiento de 2.6 toneladas de azúcar por acre de caña cultivada en los llanos aluviales de Cukurova que se extienden desde la falda de la cordillera del Tauro o Taurus hasta el Mediterráneo. En 1949, al cabo de diez años de estudio, los directores de empresas azucareras y funcionarios del gobierno trataron con los dueños de algodonales la compra de estas tierras para incorporarlas a un cañaveral en proyecto que produciría toda la caña cultivada por agricultores de la empresa o empresas. Resultó, no obstante, que los propietarios de estos algodonales no estaban dispuestos a vender sus tierras a bajo precio, por lo que se abandonó el asunto. No obstante, recientemente el Primer Ministro o Presidente del Consejo volvió a ocuparse del asunto, proponiéndose obtener la colaboración de los cosechadores de algodón a cambio de una participación en la empresa mediante acciones a través de sociedades cooperativas. Éstos, conjuntamente con los productores independientes, abastecerían la central de la caña necesaria.

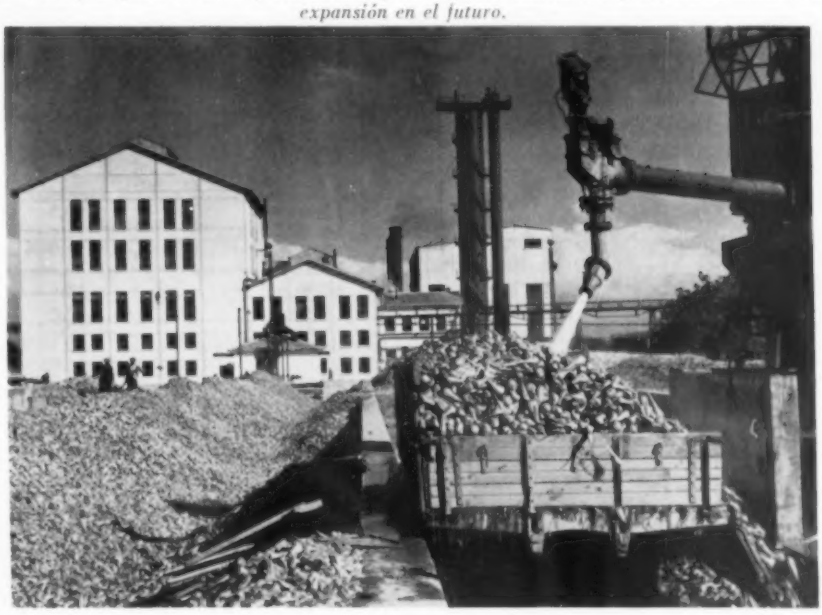
En sí, la central tendría la particularidad de ser una fábrica de azúcar de remolacha y de caña combinada en un solo edificio, provista de equipo de difusión para la remolacha y molinos para la caña, para elaborar la remolacha a principios de verano, y la caña más adelante en el otoño. La central incluiría una fábrica de celulosa en la que se obtendrían 10,000 toneladas de pulpa de bagazo.

Por otra parte, como en los llanos de Cukurova no se ha cultivado la remolacha hasta ahora, ni siquiera con fines experimentales, y como las condiciones para tal empresa no parecen ser propicias, existe la duda de que el cultivo de la remolacha resulte tan lucrativo como el de caña, a no ser que a la remolacha producida en los llanos le fijen un precio mayor que a la remolacha producida en otras regiones.

El precio de la remolacha lo determina el gobierno indistintamente de su contenido de azúcar. El mayor ingreso recibido por los productores de remolacha ha sido alrededor de $280 por acre, con un rendimiento de 8 toneladas métricas en la región del Nordeste, donde el 95 por ciento de los cultivos de remolacha son regados.

El rendimiento de caña en Cukurova ha sido entre 32 y 40 toneladas métricas por acre. Hoy día, la cosecha principal en Cukurova es el algodón, la que no se alterna con la caña. El algodón produce un ingreso alrededor de $110 por acre.

*Una fábrica de azúcar de remolacha en Turquía construida en 1953. La remolacha, recibida en carros de ferrocarril, en proceso de limpieza antes de pasar al departamento de elaboración. Turquía produce caña y remolacha, para cuyas industrias se proyecta considerable expansión en el futuro.*



# Pérdidas Indeterminadas

**Por Ajit Singh,**
**Jefe en Química**
**The Saraswati Sugar Mills, Yamunanagar, India**

La eficiencia de una fábrica de azúcar se juzga por sus pérdidas de sacarosa. La distribución de estas pérdidas refleja el trabajo de los diversos departamentos, como molienda, clarificación y cochura.

Las pérdidas conocidas varían poco de un año a otro, de modo que son las pérdidas desconocidas las que requieren mejor control, cuya eliminación permitiría obtener más azúcar. A veces, estas pérdidas resultan sumamente elevadas; algunos expertos calculan que éstas oscilan entre 4% y 15%,[1] y esta gran divergencia hace difícil establecer promedios. Algunas de estas fuertes pérdidas desconocidas pueden ser el resultado de moliendas intermitentes, errores en el peso del jugo, o errores en el análisis de las muestras.

Las pérdidas desconocidas se pueden determinar por los balances de Brix, pol, sacarosa y no azúcares. La destrucción de sacarosa en las distintas etapas de elaboración se puede determinar calculando la relación de cloruro/sacarosa antes y después de pasar los licores por las diversas etapas de elaboración. El balance de ceniza también puede revelar la naturaleza de la pérdida; tales balances son indicativos, pero no absolutos.

Estas pérdidas pueden ser motivadas por varios factores como los siguientes: (1) Errores en el análisis de muestras, especialmente los resultantes de la evaporación cuando las muestras se toman con sondas de alambre. Tal evaporación puede dar altas lecturas de sacarosa que aumentan las pérdidas indeterminadas aparentes. (2) Dificultades en el análisis de aguas dulces con diversos contenidos de azúcar. (3) Dificultades en el análisis de tortas de filtro cuando la cachaza no sale perfectamente mezclada y las muestras se toman por el método de prueba.

Además de lo anterior, la naturaleza de las muestras y la exactitud de peso son igualmente importantes. Entre otros puntos que contribuyen a la exactitud de las determinaciones de pérdidas tenemos los métodos de análisis más modernos, los conocimientos y pericia del investigador químico y el ahinco con que trabaja.[2]

Lo cierto es que las pérdidas indeterminadas no son todas desconocidas, pues se sabe que las pérdidas registradas para los filtros prensas son menores que las reales, pudiéndose decir otro tanto con respecto a los arrastres y derrames en evaporadores y destrucción de sacarosa en el proceso de clarificación; también se conocen las reacciones Lobry de Brown y Albert Ekenstein. A pesar de ello, existen ciertas pérdidas que se desconocen.

Se ha informado que el exceso de gas $O_2$ en los hornos de azufre[3] da por resultado la destrucción de sacarosa en el proceso de carbonatación por oxidación. Sin embargo, otros opinan que las impurezas precipitables a baja alcalinidad ocasionan más adelante en el proceso la formación de productos de descomposición que catalizan la degradación de sacarosa y causan la pérdida de pureza.[4]

Por ejemplo, a fines de la campaña en la India durante el mes de abril de 1957, se observó que las pérdidas indeterminadas en nuestra fábrica comenzaron a aumentar semana tras semana. A pesar de diversas comprobaciones, no se encontró razon válida alguna que explicase dichas pérdidas. Al fin se acordó recurrir al balance de sacarosa. (En nuestras fábricas se pesa todo el jugo mixto y miel final.)

El jugo mixto fué doble polarizado por el método de Steurwald de inversión en frío, porque es el más conveniente y fácil de poner en práctica. Si se hubiese obtenido invertasa a tiempo, el posible efecto deprimente de los compuestos nitrogenados durante la inversión acídica también pudo haber sido evitado.

La pérdida de pol en la torta de filtro y en el bagazo fué tomada como pérdida de sacarosa. El análisis de la miel final se hizo del mismo modo que el de jugo mixto, siguiendo el método de Steurwald de inversión en frío.

Se observó que la pureza de la sacarosa era más baja que la pureza de la pol. Esto ocurrió durante todo el período de abril 8 a mayo 18 de 1957, cuando la fábrica suspendió la molienda. Estos datos se ilustran en la Tabla I.

**Tabla I. Valores promedios durante 24 horas.**

| Pol % | Sacarosa % |
|---|---|
| *Jugo Mixto* | *Jugo Mixto* |
| 13.88 | 13.78 |
| 13.97 | 13.65 |
| 14.01 | 12.98 |
| 13.86 | 13.39 |
| 13.98 | 13.78 |
| 13.52 | 13.43 |
| 13.97 | 13.72 |
| 13.13 | 13.13 |
| 14.16 | 13.87 |
| 14.26 | 14.00 |
| 13.64 | 13.71 |
| 13.32 | 13.23 |
| 14.01 | 14.00 |
| 14.06 | 13.94 |

La tabla anterior demuestra claramente que la diferencia es considerable, y explica gran parte de las pérdidas desconocidas. La Tabla II indica los balances a base de pol y a base de sacarosa obtenidos en corridas semanales durante los meses de abril y mayo de 1957.

**Tabla II. Análisis de jugo mixto: Brix 17.62; Pol 13.86; Pureza 78.66**

| *(Por Ciento Caña)* | | |
|---|---|---|
| Azúcar en caña | 12.85 | 12.65 |
| Azúcar en bagazo | 1.05 | 1.05 |
| Azúcar en jugo mixto | 11.80 | 11.60 |
| Azúcar en azúcar comercial | 9.88 | 9.88 |
| Azúcar en torta de filtro | 0.13 | 0.13 |
| Azúcar en miel final | 1.27 | 1.40 |
| Azúcar no determinado | 0.52 | 0.19 |
| Total | 2.97 | 2.77 |
| **Análisis de jugo mixto: Brix 16.96; Pol 12.72; Pureza 75.00** | | |
| Azúcar en caña | 12.27 | 12.21 |
| Azúcar en bagazo | 1.11 | 1.11 |
| Azúcar en jugo mixto | 11.16 | 11.10 |
| Azúcar en azúcar comercial | 9.24 | 9.24 |
| Azúcar en torta de filtro | 0.13 | 0.13 |
| Azúcar en miel final | 1.51 | 1.65 |
| Azúcar no determinado | 0.28 | 0.08 |
| Total | 3.03 | 2.97 |

Los balances ateriores indican que la diferencia entre las pérdidas desconocidas a base de pol y a base de sacarosa es apreciable.

Las pérdidas desconocidas comenzaron a aumentar con la caída de granizo. Pudo haber sido una coincidencia o el efecto de repetidas lluvias lo que produjo este cambio en la composición de los jugos de caña. Tal efecto no se pudo comprobar determinantemente por falta de datos comparativos para el año anterior. La Tabla III indica la caída de lluvia durante las últimas tres campañas.

**Tabla III.**

| *Año* | *Dic.* | *Enero* | *Feb.* | *Marzo* | *Total* |
|---|---|---|---|---|---|
| 1955 | Nada | 3.707 | 0.139 | 0.280 | 4.128 |
| 1956 | 0.186 | 0.563 | 0.130 | 2.683 | 3.562 |
| 1957 | Nada | 3.381 | Nada | 0.884 | 4.265 |

Este efecto es muy posible que se deba al cambio en la relación de fructosa a glucosa, o quizás se deba a la presencia de no azúcares ópticamente activos en el jugo.

Con los recientes adelantos en química analítica, especialmente en el campo de la cromatografía, debe ser posible encontrar la verdadera causa de este fenómeno. Durante el proceso de elaboración, los ácidos ámicos se transforman en aminoácidos, cuya rotación es bastante distinta.[5] Además, las rotaciones difieren según el pH del medio en que se polarizan. Estos y otros efectos similares tienen que ser tomados en cuenta y estudiados detenidamente.

Los ácidos glutámico y glutínico pueden aumentar la polarización; la leucina y la isoleucina es probable que no surtan mucho efecto.

De acuerdo con H. Classen,[6] el efecto puede ser de 0.05 a 0.2%, cuyos valores dedujo de los trabajos realizados en varias fábricas de azúcar de remolacha. No se puede decir con certeza hasta qué punto los no azúcares ópticamente activos pueden afectar los balances en el caso de jugos de caña. Es muy posible que su efecto varíe de una campaña o región a otra campaña o región según las condiciones del suelo, las prácticas de abonamiento y riego, y las condiciones del tiempo.

Para estudiar las perdidas más aún, los balances deben ser divididos en dos etapas: (i) hasta la etapa de cochura y (ii) después de la etapa de cochura. Esto implicaría más equipo para pesar el sirope, en cuyo caso las pérdidas se dividirán en dos. La ineficiencia en los filtros-prensas (si existe) se hará más marcada, y el monto de las pérdidas durante la clarificación se hará más evidente. Las pérdidas después de la clarificación, o sea durante los procesos de cochura y purga, también serán indicadas separadamente, lo que permitirá tomar las medidas necesarias para reducir o eliminar la causa de la dificultad.

### Conclusión

La actividad óptica o algún otro fenómeno similar puede ser la causa de gran parte de las pérdidas aparentes desconocidas. Entonces, ¿es realmente la actividad óptica o un cambio en la proporción de glucosa a fructosa?

Nuestros conocimientos actuales sobre los no azúcares nitrogenados presentes en jugos de caña son bastante avanzados, gracias a los recientes adelantos en cromatografía. Recientemente[7], se descubrieron once aminoácidos en jugos de caña. La cantidad de aminoácidos varía con la variedad de la caña y disminuye con la edad, excepto en asparagina. Esto presenta un problema muy complicado para el estudio del efecto de la estereoquímica del nitrógeno.

Si la perturbación realmente se debe a la actividad óptica, ¿no sería interesante conocer el efecto del impedimento estérico sobre el tratamiento de los jugos durante el proceso de clarificación?

La perturbación causada por el fenómeno ha sido responsable casi totalmente de las pérdidas desconocidas ascendentes a 0.2% de la caña. Esto fué revelado por los balances de sacarosa y de pol obtenidos durante los meses de abril y mayo cuando las pérdidas desconocidas parecían ser elevadas. Estos estudios serán continuados durante la próxima campaña.

Será preferible obtener balances de sacarosa que de pol.

Deseo expresar mi agradimiento a Shri D. D. Puri, M.L.A., director gerente, y a Shri B. K. Khanna, M.A., administrador general, The Saraswati Sugar Mills, Yamunanagar, por haberme permitido publicar estos resultados. También quiero darle mis gracias al Prof. S. N. Gundu Rao, director, National Sugar Institute, Kanpur, por su interés este trabajo.

*Referencias*

[1] *Indian Sugar Journal*, 248 (1948).
[2] *Indian Sugar Journal*, 581 (1930).
[3] *Indian Sugar Journal*, 29 (1935).
[4] *Indian Sugar Journal*, 78 (1957).
[5] *Indian Sugar Journal*, 180 (1940).
[6] *Indian Sugar Journal*, 158 (1956).
[7] *Indian Sugar Journal*, 171 (1957).

■

# Técnicos de la Industria Azucarera

La 17ª Reunión Anual de Sugar Industry Tecnicians se celebrará en la ciudad de Nueva York los días 12 y 13 de mayo de 1958.

La asociación de Sugar Industry Tecnicians (anteriormente Sugar Industry Engineers) fué creada en diciembre de 1950 con una afiliación de 15 ingenieros; los señores R. S. Kent y F. M. Gibson fueron los organizadores de la Sociedad. Su primera constitución fué adoptada en abril de 1941, en cuya fecha la Sociedad contaba con una afiliación de 38 ingenieros y químicos.

La nómina actual de socios incluye 38 socios activos y 145 socios de número. A la fecha se presentaron 144 trabajos técnicos en las distintas resuniones anuales, los que fueron distribuidos entre los afiliados.

En la Reunión Anual de 1958 se presentarán 15 trabajos técnicos durante las dos sesiones de trabajo, los que abarcarán casi todo el campo de la refinación de azúcar. Aunque todavía no se han recibido abstractos de todos los trabajos, el programa incluira la discusión de temas sobre los recientes adelantos en el manejo de azúcar crudo; filtración; afinación; adsorbentes granulares; evaporación; cristalización; envase; almacenamiento; diseño y operación de estaciones de regulación automática. Todas las refinerías de azúcar más importantes están colaborando para darle mayor realce a esta reunión.

Las oficinas de Sugar Industry Technicians se encuentran en el 150 Nassau Street, Nueva York. La Sociedad piensa obtener mayor número de socios entre los ingenieros y químicos en la industria refinadora de azúcar. El ingreso de socios residentes en el exterior ha aumentado desde la última reunión anual. El Comité Ejecutivo se está esforzando cada día más por mantener las altas normas establecidas por los fundadores de S.I.T. y preparar programas que resulten interesantes y beneficiosos para todos los socios.

■

## Baja en Ingresos de la Fajardo para 1956-1957

Como resultado de la prolongada sequía y el fuerte ciclón que dañaron las siembras de caña en Puerto Rico y se reflejaron en los precios mundiales y nacionales del azúcar, el ingreso neto de la Fajardo Sugar Company, después de descontar los impuestos, bajaron de $244,148 (68¢ por acción) en 1956 a $36,810 (10¢ por acción) en 1957.

En su informe anual a los accionistas, el Sr. Gunnar Gromen, presidente de la Fajardo, hizo referencia especial a los cambios efectuados en sus centrales al sistema de manejo y almacenaje del azúcar a granel en vez de en sacos. Estos cambios y el nuevo almacén a granel de 45,000 toneladas de capacidad en Canovanas será de gran ayuda para la compañía en afrontar las huelgas marítimas y en establizar los precios cuando el mercado está temporalmente deprimido. La Fajardo, dijo el Sr. Frome, está cooperando con los productores de caña para aumentar la producción y la mecanización en el sector agrícola. Durante la última campaña se probó una cosechadora mecánica, y dicen que promete grandes posibilidades.

■

## Tendencia en la India Hacia Cooperativas de Ingenios Azucareros

El mes pasado, la legislatura de la India rechazó una resolución con miras a la nacionalización de la industria azucarera. El Ministros de Alimentos, que se opuso a tal resolución, expresó su aprobación de la tendencia hacia la administración por cooperativas de los nuevos ingenios azucareros. De las 59 licencias otorgadas para la apertura de nuevos ingenios, 39 fueron a ingenios administrados por cooperativas. El Ministro manifestó que prefería esperar hasta que se tuviese más experiencia en la operación de cooperativas antes de hacer esfuerzo alguno por colocar las fábricas de azúcar existentes en el mismo plan.

*Entre 1910 y 1954*

# Puerto Rico Aumenta el Uso de Abono 1000%

**Por Arturo Riollano**

YA EN 1910, los productores de caña en Puerto Rico, alentados por los resultados de estudios sobre el valor de fertilizantes para la caña, comenzaron a emplear fuertes cantidades de abono en sus cañaverales.

A veces ha sido difícil decidir si tales estudios justificaron el empleo tan extenso de fertilizantes, cuyo último siempre ha inspirado a los investigadores a determinar la mejor forma de abonar los cañaverales para obtener máximos rendimientos de caña y de azúcar.

En términos de azúcar aprovechable, la producción de caña en Puerto Rico casi fué cuadruplicada desde 1910 hasta 1954 (ver Tabla 1), mientras que la extensión sembrada apenas fué duplicada. Debido a la escasa extensión y topografía de la Isla, la cantidad de tierra propia para cañaveral es limitada, lo que limita los aumentos an las siembras. Este gran aumento en rendimiento de azúcar por hectárea se debe al empleo de nuevas y mejores variedades de caña y de fertilizantes. El consumo de fertilizantes fué decuplicado desde 23,734 toneladas en 1910 hasta 247,995 toneladas en 1952. Excepto en el período de 1942-44 durante la Segunda Guerra Mundial, cuando las importaciones de fertilizantes fueron reducidas, el uso de abonos aumentó continuamente. La reducción de fertilizante se reflejó en los rendimientos de 1943-46 que bajaron del nivel de 1,000,000 de toneladas de azúcar.

A principios del siglo veinte, la mayoría de las fórmulas de abonos usados para la caña eran las popularmente usadas en los Estados Unidos para otras cosechas. No se ha tratado de adaptar las fórmulas de abonos a las necesidades especiales de los suelos y cosechas de Puerto Rico. Entonces se usaban fórmulas de abono como 3-9-3, 9-6-3 o 10-6-0. Las aplicaciones por unidad de tierra eran reducidas. Los productores de caña se dieron cuenta del valor de los datos obtenidos de los experimentos llevados a cabo por la Estación Experimental Agrícola, y comenzaron a seguir las recomendaciones de la Estación. Se registró un aumento en el empleo de abonos con mayor contenido de nitrógeno y menor contenido de fósforo para la caña, y se aumentó la cantidad de abono por unidad de tierra.

Hoy día, la fórmula de abono corriente en Puerto Rico es 12-4-10 ó 14-6-8 (36) a razón de 1,200 libras por acre. La base de nitrógeno suele ser sulfato de amonio (20 por ciento N), aunque en la preparación de formúlas de abonos mixtos, como 18-0-6, también se usan fosfatos amoniacados, urea y otras fuertes bases de nitrógeno sintéticas con el sulfato de amonio. El nitrato de amonio se emplea poco debido a su alto costo de manejo y por ser muy explosivo si no se maneja debidamente. El fósforo se agrega en forma de superfosfato (20 por ciento $P_2O_5$) hecho en Puerto Rico de roca de fosfato y ácido sulfúrico. El potasio suele agregarse en forma de muriato de potasa (60 por ciento $K_2O$).

Los productores de caña en Puerto Rico generalmente vienen siguiendo la norma de usar fórmulas de abono completo bien equilibradas a fin de evitar el agotamiento de los principales factores de crecimiento en sus cañaverales.

El abono suele aplicarse una o dos veces a la caña por medios manuales. En cañas de planta, el abono se aplica una vez después de la germinación y alguna lluvia, generalmente a las cuatro a seis semanas después de la siembra; en cañas de retoño, el abono se aplica una vez uno o dos meses después del corte. En el caso de dos aplicaciones de abono, una se hace después de la siembra o del corte, y la otra al cabo de unas seis semanas.

A fines del período de 1910-54 se introdujeron dos innovaciones en el empleo de fertilizantes que cambiaran extensamente las prácticas de abonamiento en Puerto Rico. La primera es el empleo de amoníaco anhídrico iniciado en Puerto Rico en escala comercial por Luce & Company en el Central Aguirre en 1952. El amoníaco se aplica al suelo en forma de gas durante la aradura o en el agua de riego. Este método le brinda grandes economías al productor de caña tanto en el costo de nitrógeno como en su aplicación. Ahora, la Luce & Company y la Autoridad de Tierras de Puerto Rico están usando agua amoniacal (20 por ciento N) en sus cosechas de caña. El empleo de agua amonical se recomienda por las economías que se obtienen en el precio por unidad de N y por el menor costo del equipo necesario para su aplicación, comparado con el de amoníaco anhídrico.

La segunda innovación es la mecanización del abonamiento de la caña de azúcar, primeramente empleada en la aplicación de amoníaco anhídrico y ahora extendida a la aplicación de abonos sólidos mixtos. Los nuevos abonos químicos vendrán a resolver

*Este equipo motorizado usado para la aplicación de abono en Hawaii es similar al equipo mecánico ahora extensamente en uso en Puerto Rico para aplicar unas 190,000 toneladas de abono anuales a sus siembras de caña.*

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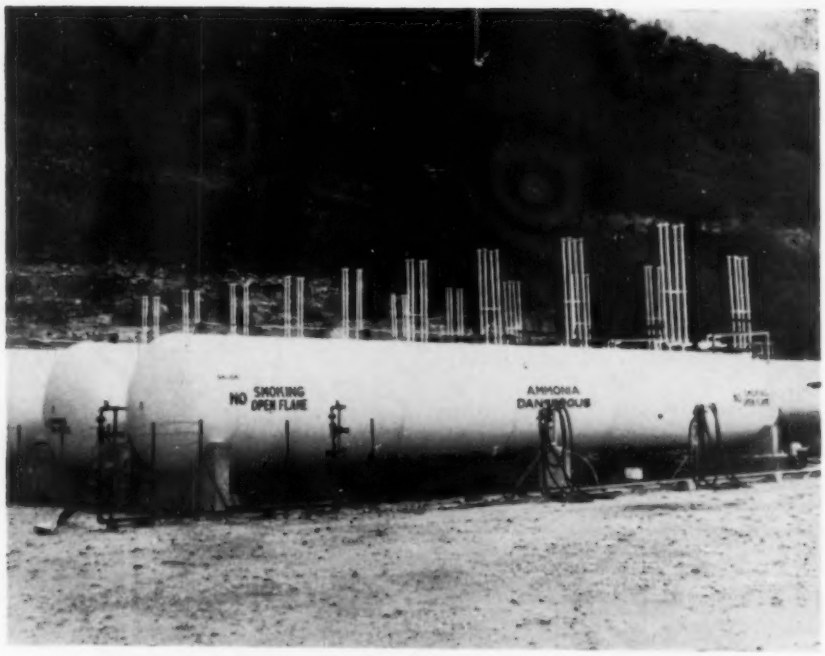



*El amoníaco anhídrico, un abono popular extensamente en uso en Puerto Rico, se deposita en tanques a presión propiedad de la Gonzalez Chemical Company, de donde se distribuye a los agricultores.*

**Tabla I. Importación de Abonos y Producción de Azúcar en Puerto Rico, Período de 1910-52.**

| *Campaña* | *Importación de Abonos* (Tons.)* | *Producción de Azúcar (Tons.)* | *Siembra de Caña (Acres)* |
|---|---|---|---|
| 1910-11 | 23,734 | 349,840 | 196,000 |
| 1911-12 | — | 371,076 | 196,000 |
| 1912-13 | 18,836 | 398,004 | 196,000 |
| 1913-14 | — | 351,666 | 196,000 |
| 1914-15 | 24,290 | 346,490 | 196,000 |
| 1915-16 | — | 483,389 | 223,000 |
| 1916-17 | 45,767 | 503,081 | 223,000 |
| 1917-18 | 40,811 | 453,793 | 223,000 |
| 1918-19 | 21,815 | 406,133 | 223,000 |
| 1919-20 | 50,083 | 485,887 | 240,000 |
| 1920-21 | — | 491,114 | 241,000 |
| 1921-22 | 43,260 | 405,936 | 244,180 |
| 1922-23 | 56,789 | 379,071 | 239,676 |
| 1923-24 | 75,670 | 447,973 | 236,600 |
| 1924-25 | 68,031 | 660,532 | 240,010 |
| 1925-26 | 79,575 | 606,464 | 242,745 |
| 1926-27 | 93,096 | 630,201 | 236,148 |
| 1927-28 | 91,455 | 751,692 | 237,746 |
| 1928-29 | 93,961 | 586,578 | 251,018 |
| 1929-30 | 101,270 | 872,327 | 254,239 |
| 1930-31 | 98,413 | 787,796 | 279,165 |
| 1931-32 | 87,888 | 992,433 | 293,953 |
| 1932-33 | 95,356 | 834,310 | 300,071 |
| 1933-34 | 120,809 | 1,113,697 | 300,126 |
| 1934-35 | 87,800 | 780,741 | 299,384 |
| 1935-36 | 123,867 | 926,037 | 299,804 |
| 1936-37 | 179,399 | 996,346 | 300,951 |
| 1937-38 | 160,200 | 1,077,120 | 300,567 |
| 1938-39 | 97,444 | 851,959 | 314,300 |
| 1939-40 | 130,090 | 1,018,804 | 303,399 |
| 1940-41 | 137,068 | 931,997 | 337,000 |
| 1941-42 | 107,525 | 1,147,587 | 337,900 |
| 1942-43 | 45,593 | 1,039,237 | 319,400 |
| 1943-44 | 150,520 | 723,360 | 312,600 |
| 1944-45 | 168,757 | 963,747 | 335,800 |
| 1945-46 | 169,786 | 909,000 | 351,700 |
| 1946-47 | 220,373 | 1,088,000 | 364,800 |
| 1947-48 | 185,525 | 1,108,000 | 369,400 |
| 1948-49 | 185,009 | 1,277,000 | 376,400 |
| 1949-50 | 222,050 | 1,286,000 | 382,000 |
| 1950-51 | 338,877 | 1,228,000 | 396,000 |
| 1951-52 | 247,995 | 1,360,000 | 420,000 |

* El 80% de estos abonos se emplean en siembras de caña.

el problema de los abonos mal preparados y endurecidos y las aplicaciones manuales para los productores de caña en Puerto Rico.

Los productores de caña generalmente utilizan el 80 por ciento del consumo total de abonos en Puerto Rico, lo que representa unas 180,000 toneladas de abono aplicadas a los cañaverales de la Isla al año. Con equipo mecánico para la aplicación del abono, una reducción en los costos de producción y un mercado seguro para el azúcar, el consumo de 200,000 toneladas o más de abono por la industria cañera de Puerto Rico podría ser un hecho en el futuro.

■

## El Grupo Zerban Escucha a Dudley Smith

El Sr. Dudley Smith, vicepresidente de la Asociación de Productores de Azúcar de Puerto Rico, cuyo domicilio social está en Washington, dirigió la palabra a la Zerban Sugarmen's Association el 13 de noviembre en el Chemists Club de Nueva York. Su tema fué la industria azucarera en Viet-Nam, la que describió como sumamente primitiva; indicó que se estaban estudiando medios de elevar la eficiencia de dicha industria sin alterar radicalmente los procedimientos técnicos comunes al país.

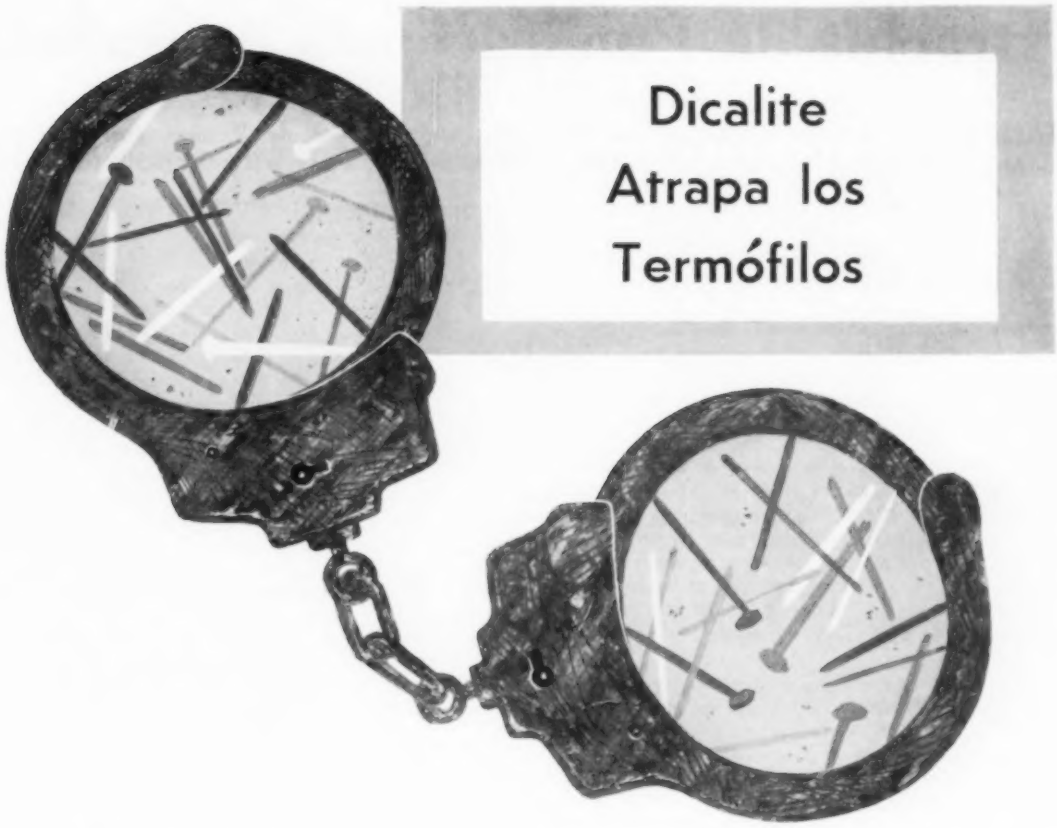
El Sr. Smith regresó recientemente de un extenso recorrido por Asia Sudoriental; señaló cómo el programa norteamericano de ayuda a países extranjeros se podría aplicar a la industria azucarera en aquel país, lo que a la vez ofrecería otra barrera económica a nuevas intrusiones comunistas. Uno de los distinguidos visitantes extranjeros al almuerzo fué el Sr. Eduardo Titus, administrador general de la refinería en Viña del Mar, Chile, presidente del Club de Ingenieros de Valparaíso, y decano del Colegio Católico de Química en la misma ciudad.

■

## Vivian Joseph Gianelloni

Vivian Joseph Gianelloni, presidente de la Punta Alegre Sugar Corporation, falleció el 13 de noviembre en la Habana, Cuba, a los 65 años de edad.

El Sr. Gianelloni era graduado de la Universidad Estatal de Louisiana con el título de ingeniero mecánico, habiendo ingresado en la Punta Alegre en 1917. En 1938 fué nombrado su vicepresidente, y en 1951 fué elevado a presidente.




CON Dicalite, la regulación de la calidad se hace más fácil—porque con los auxiliares filtrantes Dicalite usted puede filtrar con tanta precisión que casi todas las partículas indeseadas son eliminadas—incluso los coloides submicroscópicos y las bacterias termofílicas.

Los técnicos azucareros mismos han probado este importante hecho innumerables veces, tanto en el laboratorio como en trabajos de fábrica. Y sus pruebas también confirmaron el hecho que los auxiliares filtrantes Dicalite—que son esterilizados durante su preparación—no sustentan bacterias vivas.

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# Extractos de Publicaciones Azucareras

**Publicados bajo los Auspicios de la Sociedad Internacional de Tecnólogos Azucareros de Caña por Arreglo Especial con SUGAR y AZUCAR—Dr. O. W. Willcox, Redactor Técnico**

## Agronomía

### Eflorescencia Inducida en Cañas de Azúcar

M. VIJAYASARADHY, R. NARASIMHAN y S. J. S. NATHAN, *Indian Journal of Sugar Cane Research*, Vol. 1, Parte 3, págs. 151-163 (Abril-Junio, 1957).

Ante la circunstancia que las épocas de florecimiento de distintas cañas de azúcar no coinciden en todo caso, no ha sido posible obtener cruces de cañas que reunan las cualidades comerciales deseadas. Los investigadores en Norteamérica y en el Japón han concebido varios métodos para inducir florecimientos simultáneos y en la India también se ha realizado bastante trabajo en este sentido, cuyo último ha culminado en el siguiente método establecido en el Coimbatore Sugarcane Breeding Institute.

Se toman trozos de una yema de distintas variadades de caña, se dejan germinar en arena en febrero, y luego se transplantan en macetas de 18" x 18" llenas de tierra de buena calidad. Las macetas con las plantas se disponen en hileras de cuatro a seis de cada variedad en un lugar cercado de estacas, cuyos lados y parte abierta se pueden tapar o dejar destapados para admitir o excluir la luz del sol. Se construyen cercos independientes de 56'x14'x12' o de 112'x14'x112' para cada tratamiento a la obscuridad o a la luz. Para los tratamientos a la obscuridad, los lados de la estacada se tapan con estera gruesa y la parte de arriba con una tela gruesa obscura antes de la salida del sol. Procediendo de esto modo, la luz que entra en el recinto durante el día es sólo 0 a 1.5 bujías-pie al mediodía. El tratamiento a la obscuridad (día corto) se realiza conservando el recinto tapado de 2 a 6 horas (óptimo 4 horas) durante la mañana; el tratamiento a la luz (día largo) se realiza a plena luz de día al descubierto, seguido de varias horas de luz artificial (100 bujías-pie). Aparte de lo anterior, las plantas se dejan crecer bajo condiciones perfectamente naturales.

Bajo el tratamiento con luz adicional, todas las variedades permanecieron en estado vegetativo, pero al someterlas subsiguientemente a tratamiento a la obscuridad generalmente florecieron al mismo tiempo. El período de eflorescencia simultánea o concurrente puede durar un mes, pero a veces el período de máxima copiosidad es muy breve. Debido a su poco desarrollo (por falta de N y P en el suelo), algunas variedades tienden a permanecer en estado vegetativo.

Por lo general, este sistema ha dado muy buenos resultados, y si el trabajo que implica se realiza con cuidado, puede decirse que ahora se pueden cruzar cualesquiera dos variadades.

■

### Experiencia con el Método de Análisis Partiendo del Factor de Pol

WILLIAM S. K. BRANDT, *Informe*, Hawaiian Sugar Technologists, págs. 97-98, 1956.

El método de análisis de la caña partiendo del Factor de Pol recientemente concebido se encuentra ahora extensamente en uso por la industria azucarera en la interpretación de experimentos de campo. Este método ofrece un medio más exacto para determinar la calidad de la caña que el método partiendo del Factor de Calidad. Con el primero se obtiene una determinación directa de Pol y Fibra % caña. El Factor de Pol permite distinguir entre variedades de caña y aun la misma caña de diversos ensayos experimentales que puedan variar en el % de jugo. Por otra parte, los valores del Factor de Calidad se fundan solamente en el jugo y ciertos supuestos; por consiguiente, los valores de rendimiento de ensayos de campo pueden ser erróneos, puesto que no toman en cuenta la proporción de Jugo a Fibra.

Al comparar variedades o ensayos, el valor de toneladas de caña por acre se multiplica por el valor de Pol % caña, lo que nos da el valor de toneladas de Pol por acre, o sea la cantidad de azúcar por acre. No obstante, en campos abonados o regados, un alto valor en toneladas de Pol por acre tal vez no refleje el mejor resultado, ya que el costo de aplicaciones adicionales de abono o agua de riego puede contrarrestar la ganancia en toneladas de Pol por acre. Otro tanto sucede con distintas variedades de caña, puesto que un alto rendimiento en caña puede equivaler a un bajo valor de Pol % Caña y, por consiguiente, producir igual valor en toneladas de Pol por acre, comparado con otra variedad de mucho menos rendimiento en caña. En el primer caso, el costo de recolección, acarreo y molienda será mucho mayor para el mismo rendimiento en azúcar.

El siguiente ejemplo ilustra el efecto de altos contenidos de fibra: en un tiempo, la variedad 48-2094 fué considerada como buena productora de jugo, según el método de análisis partiendo del Factor de Calidad; subsiguientemente se encontró que contenía un alto valor de fibra, por lo que fué descartada como caña comercial. Un ejemplo de bajo contenido de jugo lo tenemos en la variedad 49-3856, que en un ensayo de campo acusó un bajo valor de Pol % Caña y una pérdida en toneladas de Pol por acre, comparado con cañas de testigo. La decisión de adoptar o descartar esta variedad dependerá de los resultados de nuevos ensayos. En otro caso, un ensayo de campo demostró que la variedad 38-2915 no era tan buena productora de jugo como la variedad 37-1933, pero produce más toneladas de Pol por acre por su mayor rendimiento en caña y menor contenido de fibra.

■

## Tecnología

### "Automatización" en la Refinería de St. Lawrence

D. I. WANKLIN y GEOFFREY CONSTABLE, *16ª Reunión* de Sugar Industry Technicians, Abril de 1957.

Una nueva instalación dispuesta entre las válvulas de pie de cuatro tachos al vacío y los granuladores, compuesta de mezcladores de nuevo tipo, una batería de seis centrífugas Western States tipo GS completamente automáticas, un sistema de granuladores que elimina los depósitos de azúcar húmedo, y tanques de meladura y receptores de lavajes con reguladores de Brix y nivel automáticos, es ahora operada por un solo hombre cada turno, estacionado en las centrífugas, en vez de los siete hombres que se necesitaban anteriormente. La instalación que hizo posible esta economía en personal se describe como sigue:

# DEJE QUE ESTA CARGADORA DE CAÑA DE SERVICIO PESADO LE AYUDE A ACELERAR SU RECOLECCION

*Cargadora Bucyrus-Erie 22-B de servicio pesado cargando caña en un camión montado en carriles en un cañaveral de Hawaii.*

La rapidez con que la cargadora Bucyrus-Erie 22-B de servicio pesado realiza los trabajos de carga ha acelerado la recolección de la caña en campo tras campo. He aquí porqué:

La gran velocidad de los cables y de viraje reduce los ciclos de carga. El freno friccional de viraje ayuda a situar el botalón rápida y exactamente. Los dos cables del arpeo son gobernados por una sola palanca, lo que permite agarrar cargas completas rápidamente. Un tensor automático en el cable de suspensión hace el manejo del arpeo uniforme y seguro. El izador independiente del botalón es gobernado mecánicamente, y el botalón se alza y se baja por una sola palanca. El ángulo del botalón se puede cambiar en cualquier punto del ciclo, lo que permite situar la carga rápida y exactamente.

Los carriles tipo de tractor, de garras profundas, le dan mayor despejo y tracción en terrenos, quebrados y resbalosos. Los trinquetes positivos de retención de avance hacen su operación todavía más segura, especialmente en pendientes. La propulsión a dos velocidades le permite avanzar a una velocidad normal en el campo y trasladarse a otros campos rápidamente.

Obtenga datos completos sobre esta cargadora rápida de servicio pesado del distribuidor de la Bucyrus-Erie en su comarca, o escriba directamente a:

*Un Rótulo Familiar . . .* BUCYRUS ERIE *. . . En Escenas de Progreso*

**BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE WISCONSIN, E.U.A.**

403E57

Cuando el operador de los tachos comienza una nueva templa, la identifica apretando un botón que enciende una luz en la sala de centrífugas y hace funcionar un cronómetro que avisa al operador de las centrífugas cuando esperar la templa terminada. Cuando el tacho está listo para la descarga, el operador se refiere a un tablero auxiliar en su departamento que indica los niveles y contenidos en los mezcladores, y selecciona por medio de un interruptor el mezclador que ha de recibir la templa. Esto dispone las válvulas de admisión del mezclador y transfiere la luz que identifica la templa del tacho al mezclador en el tablero del operador de las centrífugas quien, al ver la elevación del nivel en el mezclador, asigna el número de centrífugas que se necesitan para manejar la templa y cambia el interruptor que abre las válvulas de descarga del mezclador. Los mismos interruptores transfieren la corriente a las luces que identifican la templa en cada centrífuga que recibe su carga de dicho mezclador. De este modo, las templas son identificadas hasta que salen de las centrífugas. Los cronómetros de las centrífugas y los distribuidores de meladura y agua de lavado se ajustan de acuerdo con la templa. Si el ajuste no es correcto, el reciclo de las centrífugas es interrumpido automáticamente. El jefe de la refinería es responsable de la relación de mezcla y ajuste del cronómetro, quien encuentra cuantos datos necesita en el tablero. Las centrífugas son completamente automáticas, y en este sistema repiten los ciclos en sequencias de 30 segundos a intervalos de 3 minutos. El mecanismo de carga automática en la centrífuga tiene que ser reajustado para cada templa debido a las variaciones en la densidad de la masa cocida. El mejor trabajo de carga se logra con un Brix alrededor de 90.5°. Las masas densas pueden recibir hasta unos 25 pies cúbicos de meladura "lubricante".

Aparte de la reducción en personal, otros beneficios derivados incluyen un importante ahorro en vapor debido al aumento de 47.9 a 54.8% en el rendimiento de los tachos, resultante de la eliminación de sobrecargas de las centrífugas. La eliminación de los depósitos de azúcar húmedo y de la necesidad de lavar los mezcladores entre templas también ha contribuído al aumento en rendimiento.

■

## Determinación de Azúcareres Reductores

GEORGE P. MEADE, *Sugar Journal*, Vol. 20, No. 1, págs. 32-33 (1957).

El contenido de azúcares reductores en mieles finales es un punto de suma importancia comercial, y hace años que viene siendo un punto de controversia, especialmente en cuanto a si el acetato neutral de plomo empleado en el análisis se debe usar después de la inversión de la sacarosa, pero antes de determinar el porcentaje de azúcares reductores.

Deseamos llamar la atención a un estudio preciso sobre el tema por Emma J. McDonald en el Negociado de Normas de Estados Unidos (véase Journal of the Association of Official Agricultural Chemists, Agosto 1956), cuyas conclusiones se expresan como sigue:

La clarificación con acetato neutral de plomo tiene dos efectos opuestos. Al remover el calcio, aumenta la cantidad de azúcar encontrado (por análisis); al remover la materia no-azúcar reductora disminuye la cantidad de azúcar reductor encontrado. La ausencia de uniformidad en el efecto de la defecación con plomo sobre los métodos de Lane-Eynon y de Munson-Walker demuestra que la defecación no elimina las causas de error. No obstante, el empleo del plomo puede estar justificado cuando se realiza un análisis por el cual se determinan las cantidades de dextrosa y levulosa, debido a la mayor exactitud cuando la relación d l se aparta de 1. Cuando se emplean métodos generales, los resultados serán arbitarios por el hecho que suponen que todo el material reductor presente es azúcar invertido. Otra objeción es que la defecación consume tiempo y no elimina todas las dudas. En operaciones rutinarias relacionadas con la determinación de azúcares reductores, la defecación parece ser un refinamiento no justificado porque la cantidad de plomo defecante no se puede expresar claramente y tiene que ser dejada a juicio del analista. La nueva evidencia inedicta obtenida del New Orleans Customs Laboratory (laboratorio de la aduana de Nueva Orleans) demuestra que tanto el método de Lane-Eynon como el de Munson-Walker producen los mismos resultados en mieles finales tanto clarificadas como no clarificadas.

■

## Experimentos con un Filtro Schumacher de Cerámica

MINORU AKINO y asociados, *Memoria*, Research Society Japan Sugar Refineries' Technologists, Vol. 5, No. 12, págs. 7-10, 1956. (Resumen en inglés.)

Este filtro de construcción alemana fué probado experimentalmente con la idea de usarlo como filtro de segurida para terminar licores de refinería. Este aparato se compone de cuatro celdas de cerámica en una cámara hecha de láminas de acero inoxidable; cada celda forma un tubo de 120 mm de diamétro por 250 mm de largo, cuya pared tiene 25 mm de espesor. Los ensayos se realizaron con y sin precapa. A presiones de 0.2 a 0.6 kg/cm² se obtuvieron rendimientos de filtrado de 507 a 1980 litros por hora a 64° Brix, 68° C y 11.8 centipoises de viscosidad; a 65° Brix, 65° C y 15.0 centipoises de viscosidad, el rendimiento de filtrado fué de 250 a 1170 litros por hora. Con una precapa de 1 kg de auxiliar filtrante por 1 m² de superficie filtrante, la resistencia a la filtración fué como cuatro veces la registrada en celdas sin precapa. Las celdas de cerámica son muy estables a las oscilaciones en presión, y las capas de precapa y de torta se mantienen firmemente y no se desprenden durante la filtración. La torta se desaloja fácilmente por contralavado, y no hay peligro de que ocurran fugas en la torta, como sucede con los paños de algodón en otros filtros.

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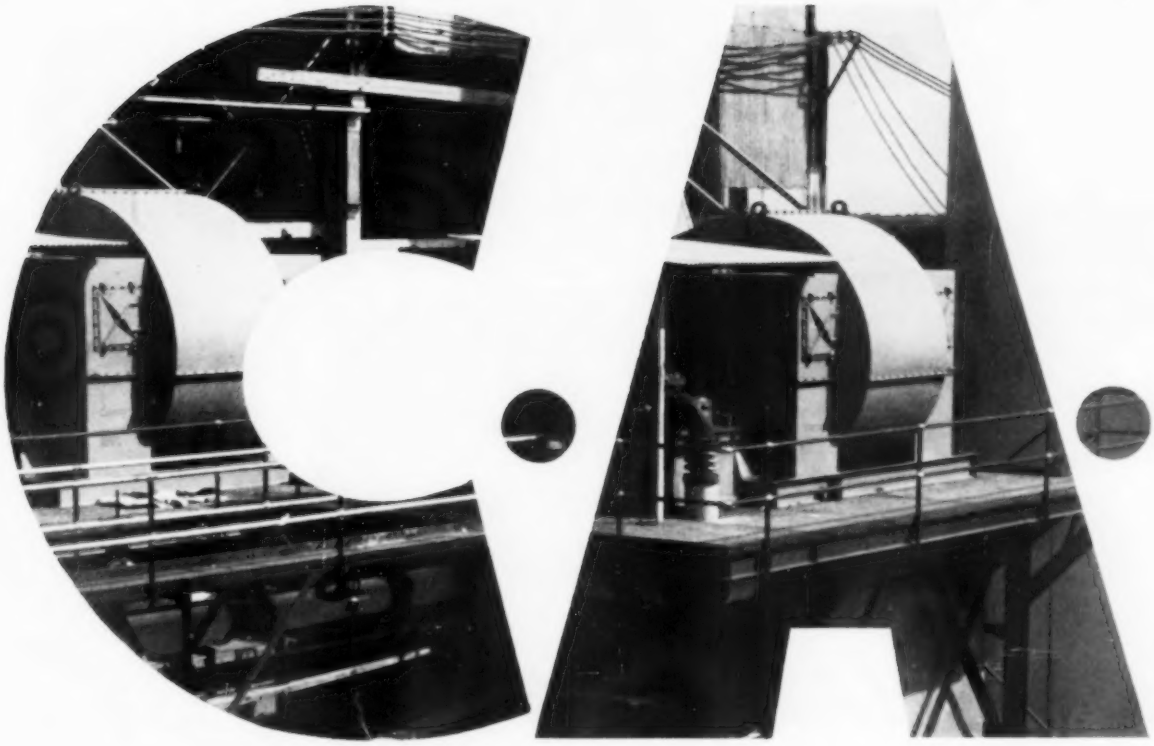
## Pago por Caña en la India a Base de Calidad

B. L. MITTAL, *Indian Sugar*, Vol. 7, No. 3, págs. 971-973 (1957).

En muchos países, los pagos por caña de azúcar se hacen a base de su contenido de sacarosa, el cual se determina por análisis de cada lote según es entregado a la fábrica. En la India, la adopción de este sistema sería seguida de grandes dificultades por la razón que existen muchísimos agricultores que producen sus cañas en pequeñas parcelas de tierra. En el territorio de una fábrica de azúcar típica en la India, con una capacidad de 1,000 toneladas de caña diarias, puede haber hasta 20,000 agricultores de caña. En una temporada de 150 días se pueden moler hasta 150,000 toneladas de caña, lo que equivale a un promedio de 7.5 toneladas por cada agricultor cultivadas en fincas con una cabida promedia de medio acre (0.2023 ha.). El contenido de sacarosa en estas cañas varía entre 8 y 13 por ciento. Resulta, evidentemente, ilógico pagar el mismo precio a todos los agricultores. La fábrica sufre el inconveniente de que como los agricultores reciben su pago por tonelada de caña, insisten en sembrar solamente aquellas variedades que maduran tarde y que producen altos rendimientos, y no se ocupan de las variedades de madurez temprana e intermedia; esto reduce el período de molienda para la fábrica y eleva los costos de producción del azúcar.

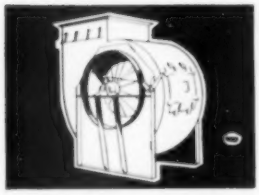
Por tal razón, se necesita un sistema práctico para analizar las cañas de cada pequeño productor separadamente. El Indian Institute of Sugar Technology está estudiando un método según

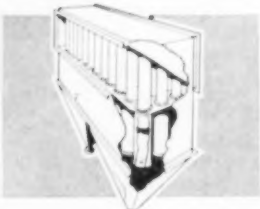
*(Sigue en la página 60)*

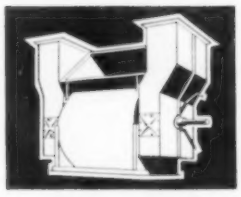


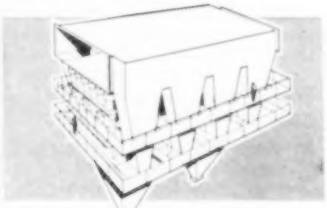
# WHIRLEX REALIZA LA EXTRACCION TOTAL DEL RESCALDO DE BAGAZO EN EL CENTRAL AGUIRRE

El *magnífico servicio* del equipo WHIRLEX durante varias campañas en cuatro calderas en el Central Aguirre, Puerto Rico, culminó en *otro pedido* de un sistema WHIRLEX completo de ventiladores, colectores y equipo de reinyección para su neuvo generador de vapor de 125,000 libras. La nueva caldera con su equipo WHIRLEX se piensa poner en servicio para la campaña de 1958.









Para sistemas de extracción de polvo completamente integrados y coordinados, tenemos disponible el siguiente equipo armado en nuestros talleres:

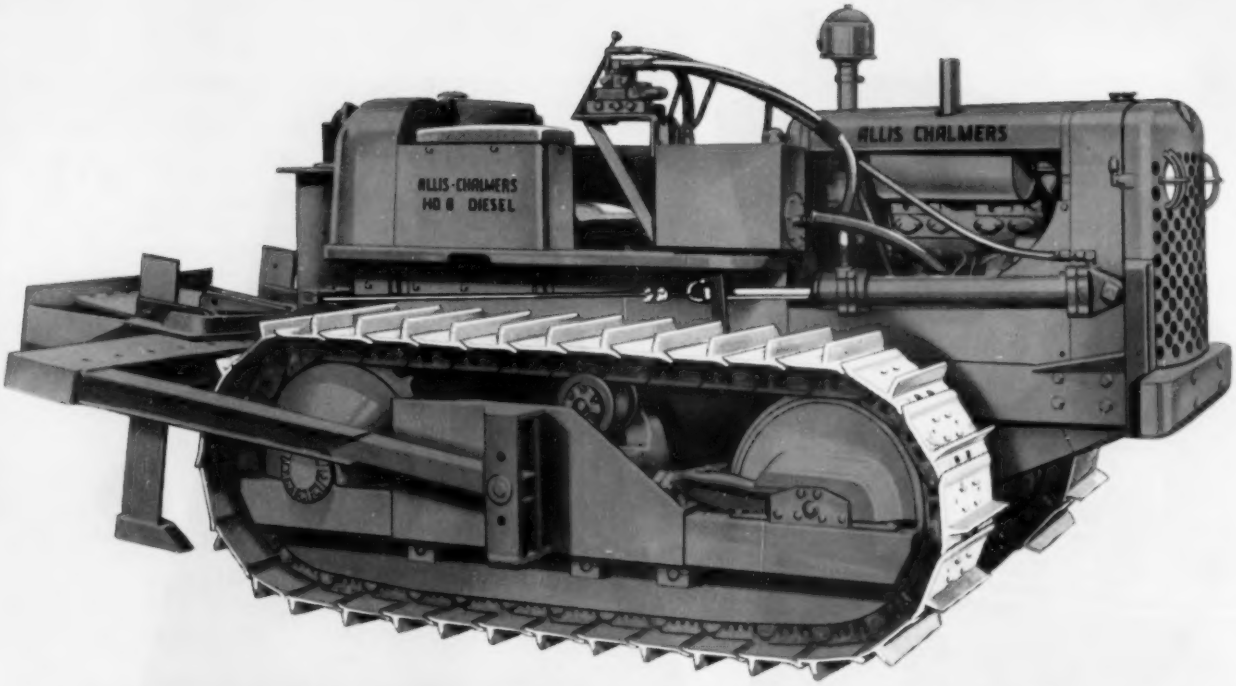
**Colectores de Gas Mecanocentrífugos Tipo WHIRLEX CTF • Colectores Multiciclónicos Tipo WHIRLEX MTSA 9CYT • Ventiladores WHIRLEX de Tiro Inducido • Ventiladores WHIRLEX de Tiro Forzado • Ventiladores Eductores WHIRLEX Industriales • Conductos Especiales • Chimeneas Autoestables • Reguladores de Tiro • Estructuras de Soporte**

*Solicite hoy mismo datos técnicos completos*

FLY ASH WHIRLEX ARRESTOR

## THE FLY ASH ARRESTOR CORPORATION

**267 North First Street Birmingham, Alabama, E. U. A.**




# ALLIS-CHALMERS HD-6

## Tractor moderno para la producción de caña de azúcar

Con la introducción de mejores variedades de caña, nuevas clases de abono y tractores de carriles modernos, la producción de la caña de azúcar ha alcanzado un grado de eficiencia mucho más alto.

El tractor Allis-Chalmers Modelo HD-6 ofrece numerosas ventajas para los productores de caña. Muchas de las principales centrales azucareras del mundo se han dado cuenta que este tractor moderno ofrece más potencia y tracción, así como mayor estabilidad en laderas y terrenos blandos.

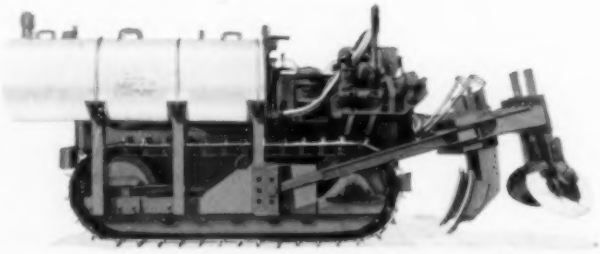
El Modelo HD-6 es insuperable para trabajos pesados como labranza profunda, labores con rastras de discos, roturación del subsuelo, recolección, remolque de carretas de caña, y muchas otras faenas que requieren potencia y tracción efectivas. La cargadora de caña ilustrada en la página opuesta ha sido expresamente diseñada para uso con el tractor Modelo HD-6, de modo que con sólo emplear esta combinación se pueden reducir considerablemente el tiempo y costos de la cosecha.

Los detalles principales de construcción del Modelo HD-6 incluyen: un potente motor diesel Allis-Chalmers con un sistema de combustión más eficiente; embrague principal de material cerámico que aumenta su duración y facilita su manejo; un sistema eléctrico de arranque directo de 24 voltios; y orugas con ruedas que requieren lubricación nada más que cada 1000 horas de servicio.

Para obtener detalles completos, comuníquese con el distribuidor de tractores Allis-Chalmers en su región.

ALLIS-CHALMERS INTERNATIONAL
Departamento AZ158, Milwaukee 1, E.U.A.

*Equipo especial para caña de azúcar, para el HD-6, fabricado y vendido por la Thomson Machinery Company, Thibodaux, La., E.U.A.*



**ALLIS-CHALMERS**

FABRICANTES DE MAQUINARIA DESDE 1847

Cargadora Hurrycane con roto-apiladora para uso con tractores Allis-Chalmers de carriles.

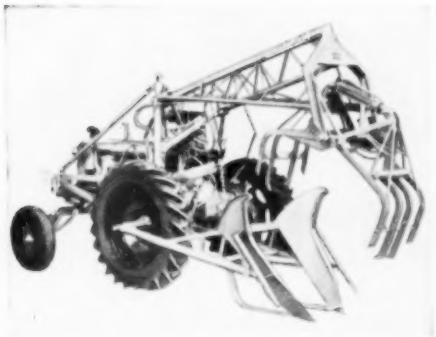
# Ahora, una familia de cargadoras Thomson *Hurrycane*

La cargadora Thomson HURRYCANE completamente hidráulica se construye ahora para uso con tractores Allis-Chalmers de carriles, tractores Thomson XTD de cuatro ruedas motrices, y tractores Thomson UC y UC Diesel de ruedas.

La cargadora HURRYCANE levanta, vira y agarra hidráulicamente—y bajo condiciones propicias, carga de 50 a 75 toneladas por hora. Apiladoras tipo de empuje o roto-apiladores disponibles para todos los tractores.

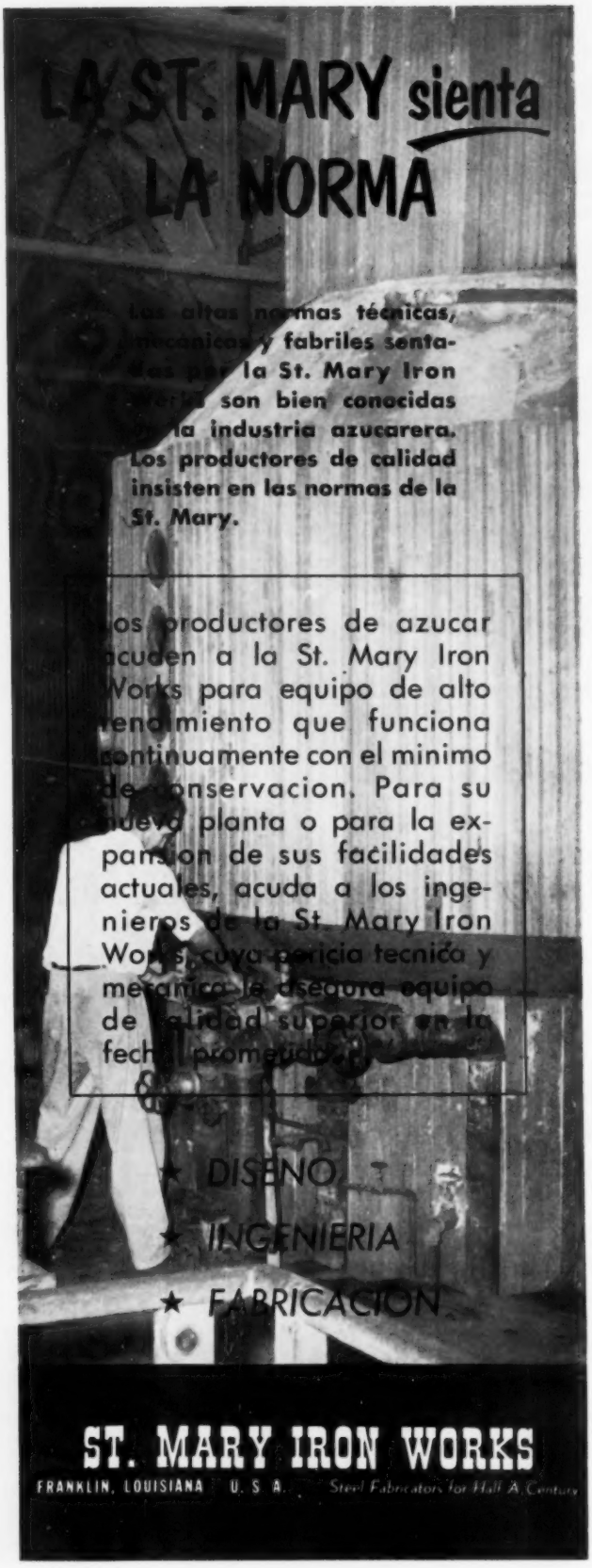
Un solo operador maneja la cargadora y el tractor hidráulicamente con fácilidad. La cargadora HURRYCANE descansa totalmente en el tractor para movimientos de avance y fácil viraje a velocidades de marcha. Llame o escriba en solicitud de más información.

**THOMSON** MACHINERY CO., INC.
Thibodaux, La., E. U. A.



Cargadora Hurrycane con apiladora de empuje para uso con tractores Thomson UC y UCD.

Cargadora Hurrycane con roto-apiladora para uso con tractores Thomson XTD de cuatro ruedas motrices.




*(Viene de la página 56)*

el cual toda la región que ha de entregar sus cañas a cierta fábrica será examinada ocho días antes de comenzar la campaña de molienda. Este estudio será realizado por un hombre (con un auxiliar) experto en el empleo del refractometro manual. Los ensayos preliminares demostraron que un inspector puede recorrer 400 acres en ocho días. Se propone tomar muestras de jugo de cinco a diez tallos de caña en fincas de uno a doce acres de extensión.

Los resultados de tales análisis serán clasificados en grupos que acusen aproximadamente el mismo Brix, correspondan a la misma variedad y reflejen el estado de la cosecha, a partir de lo cual se harán los arreglos necesarios para entregar las cañas comprendidas en cada uno de estos grupos en el mismo día. Durante dicho día se analizarán los jugos de 100 toneladas de caña y los pagos por cañas se harán de acuerdo con los resultados de este análisis.

El plan estudiado para poner dicho sistema en práctica sugiere que los costos serán relativamente módicos.

■

## Uso de Datos de Planta Experimental para la Evaluación de Nuevas Variedades de Caña en Louisiana

W. F. GILBEAU, E. E. COLL y L. F. MARTIN, *Sugar Journal*, Vol. 20, No. 1, págs. 25-27 (1957).

La operación de la planta experimental en la fábrica de Audubon para la evaluación de las cualidades de elaboración de diversas variedades abarca ahora seis campañas. El objeto de estas operaciones es determinar los valores relativos de nuevas variedades de caña producidas en criaderos experimentales para distribuirlas entre los productores de caña. Antes de poder autorizar su distribución, sus cualidades de molienda y clarificacion tienen que ser ahora comprobadas mediante ensayos en la planta experimental a fin de asegurar un acopio de cañas que se puedan manejar más provechosamente en escala comercial y que produzcan mayor rendimiento en azúcar. Se estima que cuatro años de prueba con cañas obtenidas del mismo cañaveral deben ser suficientes para poder determinar los resultados que cabe esperar de diversas cosechas.

Hasta ahora se han probado cuatro variedades de caña—C.P. 44-101, C.P. 47-193, C.P. 48-103 y N.Co. 310—durante cinco campañas. Las características aceptables como indicativas de las cualidades deseadas son: pureza del jugo clarificado; aumento de pureza del jugo crudo después de la defecación con cal; cantidad de cachaza extraída en la clarificación; y el color luximétrico del jugo clarificado. Los datos pertinentes se consignan en la tabla inserta.

**Tabla I.** Resultados Comparativos de Distintas Variedades de Caña.

| *Variedad* | *Pureza* | *Lbs. Cachaza por Ton. Caña* | *Aumento en Pureza* | *Claridad Luximétrica* |
|---|---|---|---|---|
| | | (Caña de Retoño) | | |
| C.P. 48-103 | 82.5 | 1.1 | 183 | 29 |
| C.P. 47-193 | 76.2 | 1.6 | 190 | 36 |
| N.Co. 310 | 75.0 | 1.2 | 144 | 27 |
| C.P. 44-101 | 74.1 | 1.7 | 202 | 37 |
| | | (Caña de Planta) | | |
| C.P. 48-103 | 82.0 | 1.7 | 183 | 30 |
| N.Co. 310 | 80.0 | 0.8 | 168 | 43 |
| C.P. 47-193 | 76.8 | 1.8 | 200 | 35 |
| C.P. 44-101 | 75.2 | 1.4 | 180 | 40 |

Refiriéndonos a las caractéristicas encontradas en estas cuatro variedades, vemos que de un modo general la variedad C.P. 48-103 posee la mejor combinación de las propiedades deseadas.

# Cómo entregar materiales voluminosos a un kilómetro por minuto

CORREAS transportadoras cortas y a altas velocidades pueden arrojar grandes cantidades de materiales voluminosos de un lugar a otro . . . a más de un kilómetro por minuto. Y debido a que el costo es sumamente bajo, el uso de Correas Arrojadoras se está haciendo muy popular.

Sin embargo, muy a menudo, las economías de tales correas se pierden por sus fallas prematuras.

La mayoría de las correas arrojadoras no pueden aguantar las altas velocidades, las flexiones constantes en poleas pequeñas, el polvo y la abrasión. Su adaptación es dificultosa, los fijadores se desprenden, el estiramiento es excesivo o simplemente se desgastan demasiado pronto.

La solución ya probada es la Correa Arrojadora Goodyear de Construcción Sinfín.

Reforzada con cuerdas recias de fibras múltiples o con telas sumamente fuertes . . . protegidas con cubiertas muy resistentes . . . la Correa Goodyear de Construcción Sinfín es ideal para los trabajos arrojadores. Se adapta rápidamente, no tiene fijadores que se desprendan, resiste el estiramiento, aguanta la abrasión . . . y ha probado ya más que suficiente su resistencia y duración en muchas instalaciones.

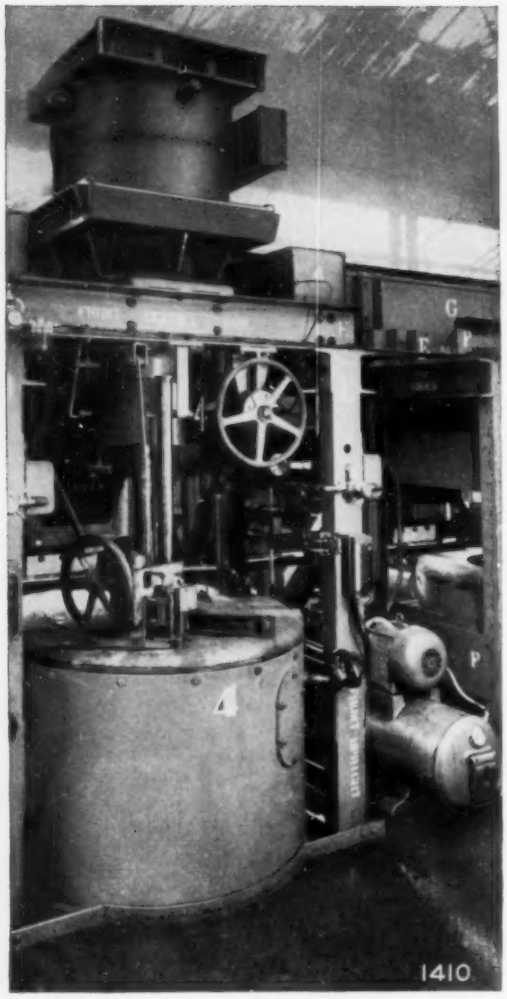
Para obtener la mejor entrega, el servicio más confiable, esté seguro que sus correas son Correas Goodyear Sinfín. Para conseguir mayor información en este respecto, refiérase a la oficina más cercana de Goodyear, o escriba a Goodyear International Corporation, Akron 16, Ohio, U.S.A.

**GOODYEAR** 60

**Los productos Goodyear son manufacturados en:**

*Alemania, Argentina, Australia, Brasil, Canadá, Colombia, Cuba, Escocia, Filipinas, India, Indonesia, Inglaterra, Irlanda, Japón, Los Estados Unidos de Norte América, Luxemburgo, Méjico, Nueva Zelandia, Perú, Sud Africa, Suecia, Venezuela. Representantes, Sucursales y Distribuidores en todo el mundo.*

"E-C Cord"—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio, U. S. A.




# CENTRIFUGAS
## MOVIDAS POR ELECTRICIDAD

ESTA centrífuga semiautomática movida por electricidad está diseñada para funcionar a tres velocidades—1500, 750 y 50 r.p.m. Está provista de descargador mecánico, sistema de limpieza a vapor, cubierta de vapor, sistema de extracción de vapor, y válvula de mezclador y levantador de válvula de descarga del canasto accionados mecánicamente. El lavado y limpieza a vapor son regulados automáticamente. La batería viene completa con compresor de aire y alternador de baja frecuencia.

**POTT, CASSELS & WILLIAMSON**
MOTHERWELL · LANARKSHIRE · SCOTLAND
*Cables:* POTT, MOTHERWELL


Sus jugos se pueden clarificar rápidamente porque sólo hay que manejar una cantidad mínima de cachaza descargada del clarificador y porque sólo una cantidad mínima de filtrado tiene que ser repasada. La claridad es excelente. El aumento en pureza es poco menos que el encontrado para la variedad C.P. 47-193, que presenta la desventaja de que sus jugos tienen que ser elaborados más lentamente debido a la mayor cantidad de cachaza y filtrado. El rendimiento teórico de la variedad C.P. 48-103 en azúcar de 96° es 213 lbs/tonelada. Esta variedad se considera que produce el mayor lucro, tanto para el agricultor como para la fábrica.

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## Resultados Obtenidos con una Resina de Intercambio Iónico en Combinación con el Proceso de Carbonatación

SHIUJI AKIMOTO, *Memoria*, Research Society Japan Sugar Refineries' Technologists, Vol. 5, No. 12, págs. 14-18, 1956. (Resumen en inglés.)

Siguiendo un extenso estudio de laboratorio (la misma Revista, Vol. 4, págs. 22-30, 1955), la fábrica de azúcar Shibaura Seito cambió su sistema de refinación del proceso de carbonatación en combinación con el empleo de carbón activado a una combinación del método de carbonatación y tratamiento por el proceso de intercambio iónico. La capacidad de esta refinería es de 400 toneladas de azúcar crudo al día. El equipo para el proceso de intercambio iónico consta de tres columnas de Amberlite 401 Cl., fabricadas por Rohm and Haas, cada una de las cuales contiene 5,000 litros de resina usada para terminar la decoloración del licor final. Los datos comparativos de los dos procesos figuran en las tablas insertas.

El costoso empleo de carbón activado fué reducido considerablemente y el costo de fabricación resultó ser aproximadamente $3.61 más bajo por tonelada. El grado de color de los licores en proceso de elaboración y, por consiguiente, de los azúcares refinos, fué reducido a tal extremo que la proporción de azúcar blanco obtenible ascendió de 82% a 90% aproximadamente. La ceniza sulfatada del azúcar duro fué reducida alrededor de 30%. Además, el proceso de intercambio iónico redunda en la eliminación de incrustación y economías en combustible, mientras que el rendimiento sigue siendo igual que antes.

**Tabla I.** Remoción Promedia de Color, %

| *Producto* | *Proceso de Carbón Activado* | *Nuevo Proceso de Refinación* |
|---|---|---|
| Licor Moreno | 56.37 | 59.97 |
| Licor Claro | 65.12 | 53.52 |
| Licor Fino | 50.00 | 90.90 |

**Tabla II.** Distribución por Grupos, %

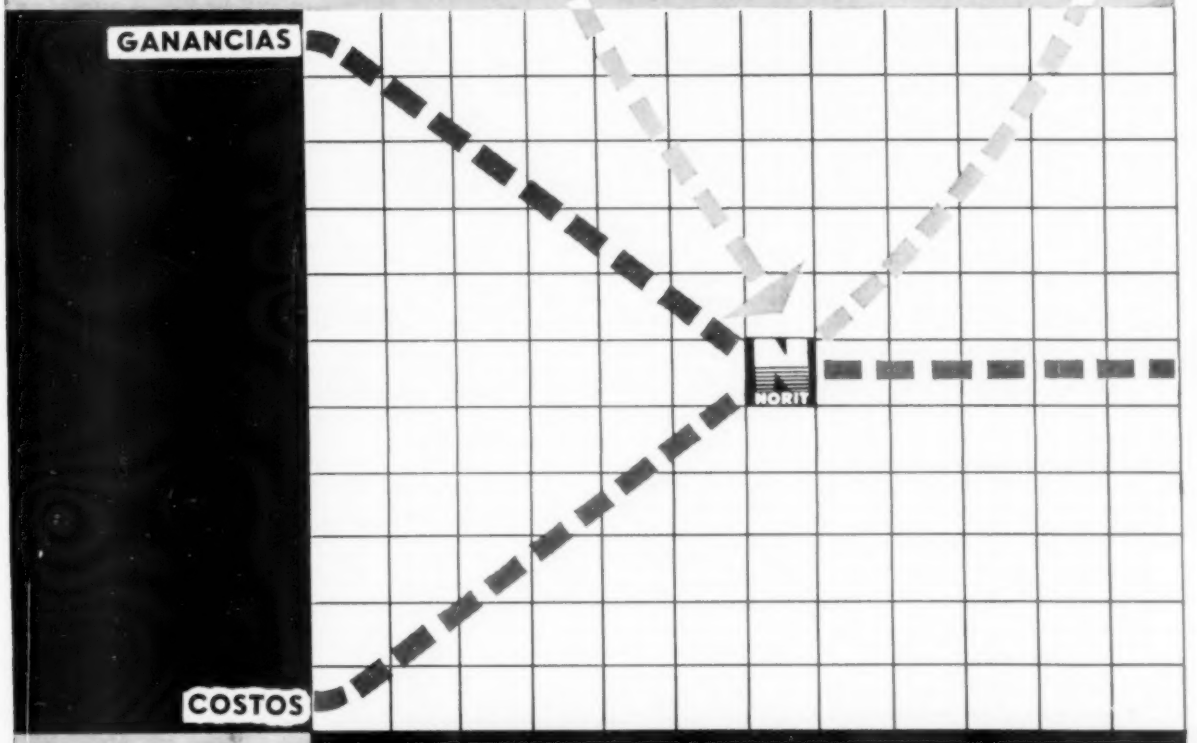
| *Producto* | *Proceso de Carbón Activado Grupos % (Promedio)* | *Ceniza, %* | *Proceso de Intercambio Iónico Grupos % (Promedio)* | *Ceniza, %* |
|---|---|---|---|---|
| Granulado Grueso y Fino | 16.38 | Granulado Grueso 0.022 | 27.71 | Granulado Grueso 0.015 |
| Blanco Blando Superior | 66.96 | Granulado Fino 0.020 | 63.51 | Granulado Fino 0.013 |
| Blanco Blando Regular y Blanco Moreno | 13.73 | | 5.17 | |
| Granulado Grueso Regular | 3.62 | | 3.59 | |

**Tabla III.** Materiales Empleados, % Azúcar Crudo

| *Material* | *Proceso de Carbón Activado* | *Proceso de Intercambio Iónico* |
|---|---|---|
| Carbón Activado | 0.61 | 0.18 |
| Kieselguhr | 0.89 | 0.32 |
| Cal | 0.022 | 0.67 |
| Fosfato | 0.025 | 0.006 |
| NaCl | – | 0.53 |

# NORIT

se interpone en el punto critico para estabilizar a un nivel razonable los costos y las ganancias




NORIT

UNITED NORIT SALES CORPORATION Ltd.

Amsterdam, Holanda

## Sobre el " 'Agotamiento' de Variedades de Caña"

El Sr. Norman J. King, Director del Negociado de Estaciones de Estudios Azucareros (Bureau of Sugar Experiment Stations), se dirige al editor de *Sugar y Azúcar* como sigue:

"Deseo llamar su atención a un extracto en las páginas 68, 72 de su edición de agosto de 1957. El suscrito es autor del trabajo extractado, y en calidad de tal me opongo rotundamente a la interpretación dada por el autor de la reseña al artículo, que yo jamás sugerí. La última frase en dicho extracto ". . . y que al agotamiento realmente se debe a la pérdida natural de vigor . . ." carece completamente de sentido y no tiene significación científica. . . . Un extracto no tiene más que un significado y no debe incluir los comentarios del revisor —excepto como una anotación al pie."

* * *

Con respeto a lo anterior, el autor de la reseña reconoce su responsabilidad por la última frase del extracto. Desafortunadamente, su comentario no iba encerrado entre paréntesis para indicar que esta cláusula debía ser tomada como comentario editorial. En este sentido, el revisor aprovecha esta oportunidad para recordar al Sr. King que los archivos de su Negociado incluyen datos que sustentan positivamente la teoría del "agotamiento". En una visita a Africa del Sur, su propagador principal de la planta de caña, el Dr. J. H. Buzacott, fué informado de un experimento realizado por tecnólogos de caña de azúcar en Mt. Edgecombe. La variedad Co. 281, en un tiempo buena productora, pero ahora comercialmente antieconómica, fué librada de plagas y enfermedades por el tratamiento con agua caliente y sembrada en un terreno de buena calidad, sano; este tratamiento beneficioso no logró que la vieja favorita recobrase su vigor prístino.

■

## Informe Anual de la Manatí Sugar Company

El presidente de la compañía, George A. Braga, informa que la ganancia neta consolidada de la Manatí Sugar Company y sus filiales en propiedad absoluta para el año fiscal terminado el 30 de junio de 1957 asciende a $777,786 o $1.75 por acción después de deducir las reservas. Esta cifra refleja la marcada mejora en la situación azucarera de Cuba, comparada con las ganancias de $275,546 en 1956, $112,359 en 1955 y $29,014 en 1954. El Central Manatí comenzó a moler el 10 de enero de 1957 y terminó el 15 de mayo con una producción de 1,007,703 sacos de 250 libras españolas, contra 862,216 sacos en 1956. Durante el año de 1957, la Manatí Sugar Company invirtió $1,069,285 en mejoras que se esperan produzcan importantes economías funcionales. El 30 de septiembre pagó un dividendo de 45 centavos por acción, que fué el primero desde 1952.

■

## Laboratorio Azucarero Observará Su 50° Aniversario

El 2 de diciembre de 1957, el New York Sugar Trade Laboratory (Laboratorio del Mercado Azucarero de Nueva York) observará su quincuagésimo aniversario.

La fundación de este laboratorio se debe en gran parte a los esfuerzos del difunto John Arbuckle por eliminar las disputas que solían surgir en el mercado azucarero sobre las discrepancias en la polarización de azúres crudos anunciada por distintos químicos para la misma muestra de azúcar. La necesidad de nombrar a un arbitrador químico surgía tan a menudo que los socios del mercado decidieron establecer su propio laboratorio.

Durante el verano de 1907, el Dr. C. A. Browne, entonces Jefe del Laboratorio Azucarero del Negociado Nacional de Normas, Washington, D. C., fué invitado a crear el laboratorio propuesto. En otoño del mismo año, el Dr. Browne asumió el puesto de químico encargado de lo que hoy se conoce como el New York Sugar Trade Laboratory y ocupó dicho cargo hasta el 1° de obtubre de 1923.

Cuando renunció el Dr. Browne en 1923, el Dr. F. W. Zerban, entonces Director de Investigaciones de Penick & Ford, fué nombrado para ocupar este cargo, donde dirigío el trabajo del Laboratorio hasta su retiro en 1955. El Dr. Zerbán fué coautor con el Dr. Browne del "Handbook of Sugar Analysis" (Manual de Análisis de Azúcar), cuya obra se usa extensamente como libro de consulta en los métodos de análisis de azúcar y miel final.

Desde que se retiró el Dr. Zerban en 1955, el Dr. W. W. Binkley, anteriormente investigador asociado en química azucarera en la Universidad del Estado de Ohio, viene ejerciendo la función de químico encargado del laboratorio azucarero de Nueva York.

El Laboratorio es una corporación dirigida por una junta de directores, dos de los cuales representan a los vendedores y otros dos a los compradores de azúcar. El Laboratorio analiza aproximadamente 17,000 muestras de azúcar y 1,000 de miel final anualmente en su local sito en 37 Warren Street, Nueva York 7, N. Y.

■

## La South Coast Declara Un Dividendo

Los directores de la compañía azucarera The South Coast Corporation declararon hoy un dividendo trimestral de 12½ centavos por acción en acciones comunes de la compañía, pagadero el 31 de octubre a accionistas registrados al cierre de operaciones el 15 de octubre de 1957.

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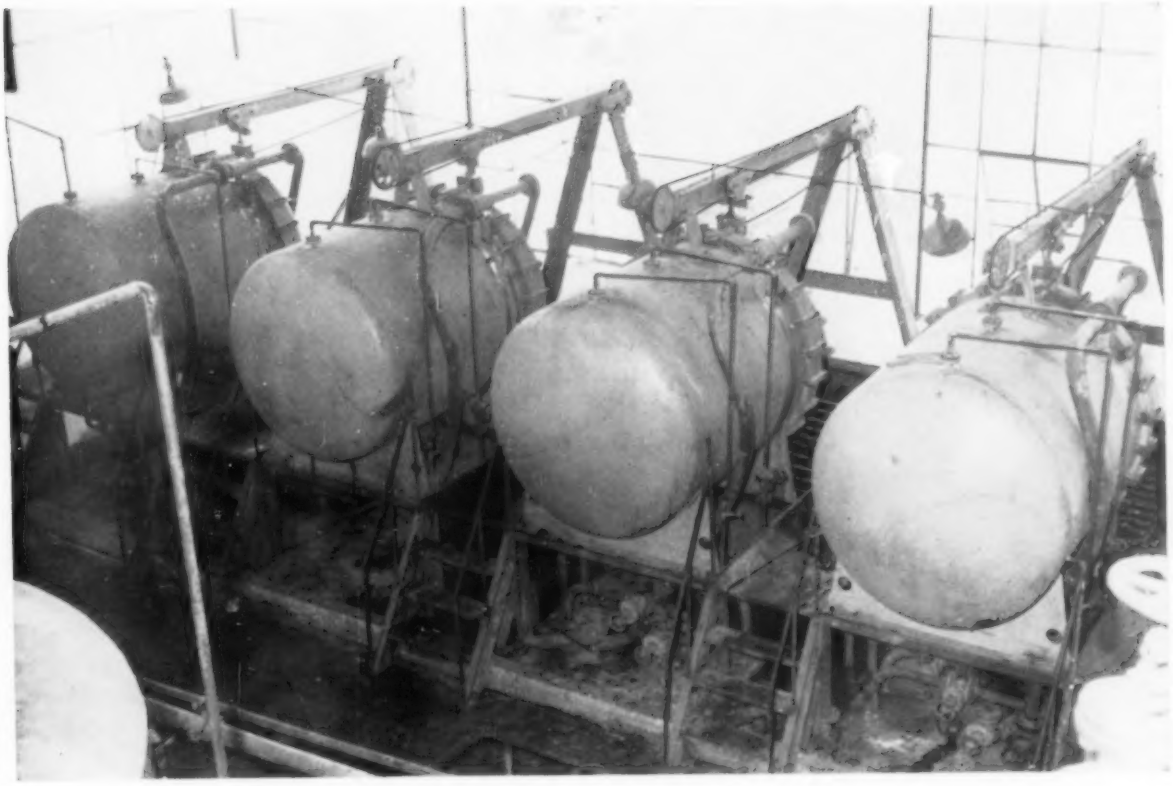

# La Industrial ayuda a una refinería en Medio Oriente a obtener mayores ganancias

## FILTROS Y PROCESO

Estos cuatro Filtors "Industrial" Horizontales fueron instalados en la Refinería de Saturs en Trípoli, Líbano, que produce 110 toneladas de azúcar refino de caña al día. Los filtros, con un área filtrante global de unos 1,400 pies cuadrados, filtran sirope a 70° Brix, 190° F. para remover el carbón activado e impurezas en el proceso de carbón a contracorriente.

## DISEÑADOS PARA EL CASO

En este caso, los filtros fueron diseñados para constituir gran parte de la estación de clarificación. Esto permitió eliminar varios decantadores y reducir en alto grado las pérdidas por inversión que suelen ocurrir cuando los jugos se retienen en los decantadores durante muchas horas a temperaturas elevadas. Ahora, los jugos son tratados químicamente y enviados a un decontador simple para unos cuantos minutos de contacto y entonces directamente a la estación de filtros. Todo este proceso se está siguiendo con sólo 1/6 del trabajo previamente necesario en la estación de filtros.

No olvide que la Industrial construye Filtros Horizontales, Verticales y Tubulares, de modo que cualquiera que sea el problema de filtración, usted puede depender de la Industrial no sólo para construir sino para diseñar y *recomendar imparcialmente* el sistema más adecuado a sus necesidades.

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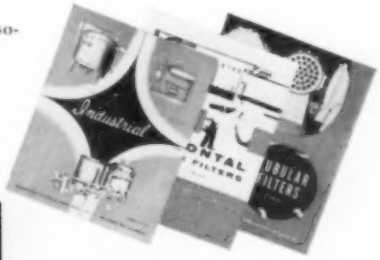
**No. NH-122**
**No. TS-160**

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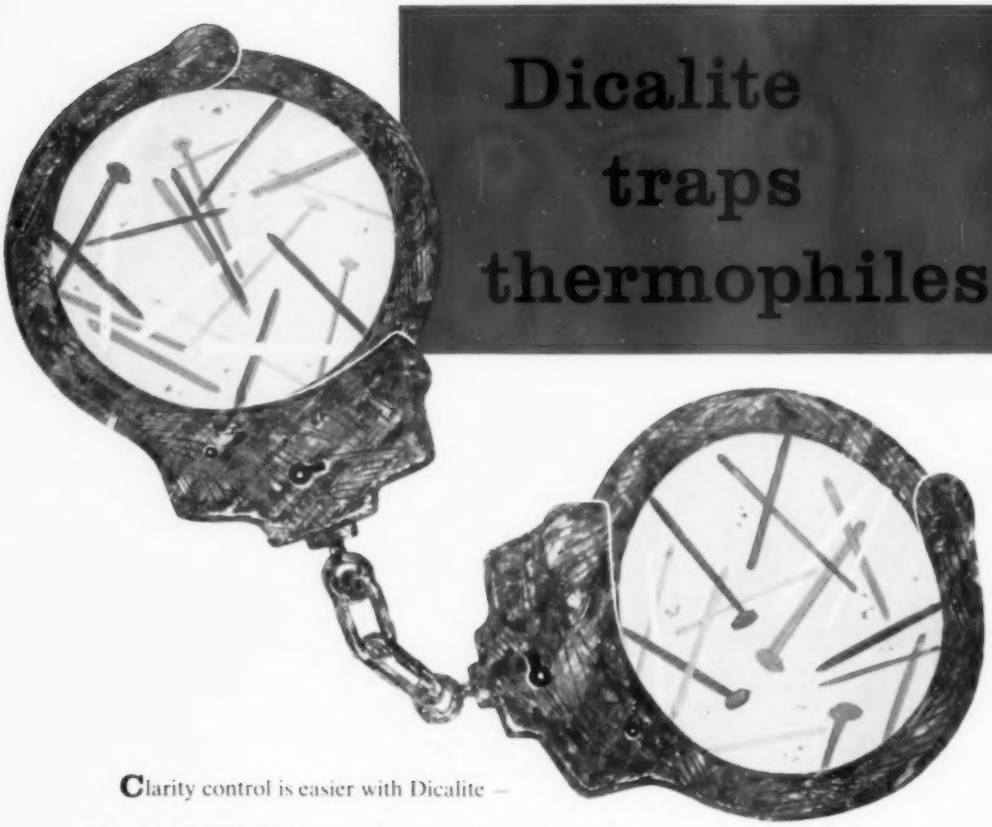
# Dicalite traps thermophiles



Clarity control is easier with Dicalite — because with Dicalite Filteraids you can have filtration so sharp that practically all unwanted particles are removed — including the sub-microscopic colloids and thermophilic bacteria!

This important fact has been proved, times without number, by sugar men themselves, both in their own laboratories and in actual plant operation. And their tests have also established the fact that Dicalite Filteraids, which are sterilized in processing, do not support bacterial life.

Chemically inert and physically stable, Dicalite Filteraids cannot affect flavor in any way. And Dicalite Filteraids are dependably uniform, one lot after the other, due to the extremely rigid controls exercised in processing all the grades of Dicalite Filteraids.

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